REPORT

Quarterly Ground Water Sampling Event Spring 2002

Sullivan's Ledge Superfund Site
New Bedford, Massachusetts

June 2002

O'BRIEN & GERE
ENGINEERS, INC.

5509/28602

REPORT

Quarterly Ground Water Sampling Event
Spring 2002

Sullivan's Ledge Superfund Site
New Bedford, Massachusetts

James R. Heckathorne, P.E.
Vice President

June 2002

O'BRIEN & GERE
ENGINEERS, INC.

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1. Introduction

1.1. Purpose and objective

The Spring 2002 quarterly ground water monitoring event was conducted at Operable Unit 1 of the Sullivan's Ledge Superfund Site from March 26 through March 29, 2002, and on April 9, 2002. Assisting O'Brien & Gere Engineers, Inc. (O'Brien & Gere) with this program were Mabbett & Associates, Inc. (M&A) and Alpha Analytical Labs (Alpha). M&A provided field sampling services and related consultation while Alpha provided analytical services. Sampling was conducted in accordance with the Final Field Sampling Plan (FSP) submitted to Metcalf & Eddy (M&E) in January 2000, as amended by M&A letters dated March 14 and March 16, 2001, an O'Brien & Gere letter dated February 11, 2002, and electronic mail from the Sullivan's Ledge Site Group dated March 22, 2002. Copies of the M&A and O'Brien & Gere letters and the Group's electronic mail are included in Appendix A.

The purpose of the quarterly monitoring report is to discuss the field work associated with the Spring 2002 quarterly sampling event, and to present data obtained during the sampling event. Upon completion of the Winter 2002 quarterly monitoring event, an annual report will be generated to provide information regarding the Winter 2002 monitoring event, and will include tables and figures and discussion relative to historical data trends.

1.2. Deviations from field sampling plan (FSP)

The following deviations from the FSP were made during the Spring 2002 quarterly sampling event in accordance with the February 11, 2002 proposed plan for the 2002 Ground Water Monitoring Program:

- Ground water samples were obtained from eight conventional monitoring wells (MW-2, MW-4, MW-6, MW-6A, MW-14, MW-15, MW-24 and GCA-1) and from ten ports from two Westbay wells (ECJ-1 and ECJ-2.) All samples were analyzed for select volatile organic compounds (VOCs) and six samples were analyzed for polychlorinated biphenyls (PCBs).

- In addition to collecting samples from monitoring wells, ground water samples were also collected from the shallow collection trench

and six bedrock recovery wells from ports within the ground water treatment plant. Samples were analyzed for twelve select VOCs, PCBs, and eight select metals.

- MW-24 exhibited turbidity levels above the desired 5 NTU. Past experience with this well indicated that longer purge times would not reduce the turbidity to 5 NTU. The well was purged for 145 minutes, resulting in stabilization of temperature, pH, conductivity, and oxidation reduction potential parameters prior to collection of the samples.

- Consistent with previous sampling events, the quantity of water sampled from each Westbay well sampling port for PCB analysis was decreased by one liter to streamline the sampling process.

- Air bubbles were observed in the flow-though cell during purging of low flow wells. Corrective actions were taken, including raising the instrument above the well head, reducing curvature of tubing to the flow through cell, and tightening the connections on the PVC cap. Air bubbles in the flow-through cell may have adversely impacted the ability to collect stabilized representative dissolved oxygen readings in certain samples.

2. Summary of field activities and analytical results

2.1. Well locations

The locations of overburden, shallow bedrock, intermediate bedrock, and deep bedrock monitoring wells (including Westbay wells) are shown on Figures 1, 2, 3, and 4, respectively.

2.2. Qualitative well integrity testing

During the Spring 2002 round, M&A observed individual wells prior to sample collection, and noted no changes from conditions observed in the integrity tests conducted in February and March 2001.

2.3. Water levels

Water levels collected on February 13, 2002 were utilized to prepare ground water contour maps for this report since the ground water treatment plant and recovery systems were not operating when the wells were sampled in March 2002. A letter by M&A dated February 19, 2002, reporting the measured depths to ground water, is included in Appendix B. Ground water contour maps are included as Figures 5 through 8.

2.4. Conventional ground water monitoring wells

A total of eight conventional ground water monitoring wells were identified, characterized, and sampled in accordance with the FSP and the QAPP through the use of an EPA-approved low-flow bladder pump system dedicated to each well.

Prior to sampling, purged ground water was monitored in a flow-through cell on-site for the parameters described in Section 2.5 of the FSP. Equipment used to perform the characterization was calibrated and used in accordance with the standards and protocols provided in Section 3.6 of the QAPP.

Following characterization, sampling of the conventional wells was completed using procedures described in Section 2.6 of the FSP. Sampling logs are provided in Appendix C of this report.

Samples were packed on ice and sent to Alpha Analytical Labs under a chain-of-custody (COC) for twelve select VOCs and PCBs analyses by methods described in Section 2.1 of the FSP, as amended by the O'Brien & Gere letter dated February 11, 2002, included in Appendix A. Trip blanks were shipped with coolers submitted to the laboratory in accordance with Section 3.5 of the QAPP.

Quality Assurance/Quality Control (QA/QC) samples were also collected in accordance with Section 3.5 of the QAPP. Duplicate sample #2 was collected from MW-2 on March 29, 2002. The MS/MSD samples were collected from MW-14 on March 29, 2002.

2.5. Westbay monitoring wells

Two Westbay bedrock wells (ECJ-1 and ECJ-2) were sampled during the Spring 2002 ground water sampling event. Westbay field sampling logs are provided in Appendix D.

Consistent with Section 2.6 of the FSP, ground water from the Westbay ports was directly sampled without prior purging or characterization. Samples collected from the Westbay bedrock wells were packed on ice and shipped under a COC to Alpha Analytical Labs for twelve select VOCs in accordance with the procedures outlined in Section 2.1 of the FSP, as amended by the O'Brien & Gere letter dated February 11, 2002, included in Appendix A. Trip blanks were shipped with coolers submitted to the laboratory in accordance with Section 3.5 of the QAPP.

QA/QC samples from the Westbay sampling were also collected, including two duplicate samples and one MS/MSD sample. Duplicate sample #1 was collected from ECJ-1 (62') on March 28, 2002. The MS/MSD samples were collected from ECJ-2 (47') on March 27, 2002. An equipment blank was collected on March 28, 2002.

2.6. Ground water recovery samples

Samples were collected on April 9, 2002, from the shallow collection trench and six bedrock recovery wells using the installed taps in the ground water treatment plant. As described in a letter dated April 5, 2002, these samples were not collected during conventional and Westbay well sampling in March 2002 since the ground water treatment plant was not in operation at that time.

Sample duplicate #1 was collected at BEI-2 and MS/MSD samples were collected from OBG-2. Samples were packed on ice and shipped under

a COC to Alpha Analytical Labs for twelve select VOCs, PCBs, and eight select metal analyses.

2.7. Validated results

Validated data from the Spring 2002 sampling round is included in the data validation report provided in Appendix E. The validated data has been downloaded into a Microsoft FoxPro relational database management system (DBMS) to facilitate future data management and trend analysis.

2.8. Analytical results

Tables 1 and 2 present the range of detected constituents in the ground water monitoring wells for twelve select VOCs and PCBs, respectively. A review of the tables suggests the following:

- Of the twelve VOCs analyzed for, cis-1,2 dichloroethene and vinyl chloride are present at the highest concentrations. The highest levels of VOCs were found at ECJ-1 and ECJ-2.

- PCBs were detected infrequently during the Spring 2002 sampling event. The highest level of PCBs (Aroclor 1242/1016) in the monitoring wells was detected at MW-24.

Tables 3, 4, and 5 present the range of detected constituents at the shallow collection trench and the six bedrock recovery wells for twelve select VOCs, PCBs, and eight select metals, respectively. A review of the tables suggests the following:

- Of the twelve VOCs analyzed for, cis-1,2 dichloroethene and vinyl chloride are present at the highest concentrations. The highest levels of VOCs were found at BEI-1 and OBG-1.

- PCBs were detected infrequently during the Spring 2002 sampling event. The highest level of PCBs (Aroclor 1254) was detected at OBG-1. The concentration of Aroclor 1254 at OBG-1 has decreased since the Winter 2001 sampling event.

- Barium was detected in each sample ranging from 0.1 to 1.8 mg/L. Aluminum, chromium, copper, and zinc were each detected in one of seven samples at 0.25 mg/L, 0.01 mg/L, 0.07 mg/L, and 0.82 mg/L, respectively. Iron was detected in each sample ranging from 2 to 120 mg/L. Lead was detected in three samples at concentrations ranging from 0.005 to 0.022 mg/L. Vanadium was not detected in any of the seven samples.

The 2002 annual monitoring report will include tables and contour maps showing VOC concentrations in the overburden and bedrock depth intervals, and will include a detailed discussion relative to historical trends in concentrations.

3. Summary, conclusions, and recommendations

3.1. Summary

A total of eight conventional wells and ten ports from two Westbay wells were sampled during the Spring 2002 ground water sampling event. Analysis was conducted for twelve select VOCs (18 samples) and PCBs (6 samples). Samples were also collected from the shallow collection trench and bedrock recovery wells using sample taps in the ground water treatment plant. Analysis was conducted for twelve select VOCs (7 samples), PCBs (7 samples), and eight select metals (7 samples). Analytical results were validated and downloaded into a Microsoft FoxPro relational database management system to facilitate data management and trend analysis that will be addressed in the annual report.

3.2 Conclusions

Some conclusions which can be drawn based on the Spring 2002 data are as follows:

VOCs

As discussed in the Winter 2001 Ground Water Sampling Report, VOCs continue to be a broad indication of ground water contamination, and based on mobility, continue to be a good indicator of potential changes in off-site migration patterns. PCBs continue to be detected only in wells that also show detection of VOCs.

PCBs

A review of Tables 2 and 4 confirms that PCBs continue to be detected in low concentrations. The concentration of Aroclor 1254 detected in OBG-1 has decreased since the Winter 2001 sampling event.

Metals

The concentrations of metals in the shallow collection trench and the six bedrock recovery wells have been consistent over time.

3.3 Recommendations

Quarterly ground water monitoring consistent with the Spring 2002 sampling event is warranted to establish a database for future evaluation of data trends. The more comprehensive annual sampling event will be performed in December 2002.

Table 1
Sullivan's Ledge Superfund Site
Spring 2002 Monitoring Event
Ground Water Data Summary
Volatile Organic Compounds1

Constituent	Number of Samples	Number of Detects	Range (µg/L)	
			Low	High
1,4-Dichlorobenzene	18	3	2.5U	38
Benzene	18	8	5U	3900
Chlorobenzene	18	9	5U	160
Ethylbenzene	18	8	0.5U	2100
Napthalene	18	1	2.5U	15
Toluene	18	8	0.75U	1400
Trichloroethene	18	3	0.5U	760
Vinyl chloride	18	16	4U	21000
cis-1,2-Dichloroethene	18	16	2.5U	45000
o-Xylene	18	1	0.5U	2.1
m,p-Xylenes	18	1	0.5U	8.6
trans-1,2-Dichloroethene	18	2	0.75U	7.5 J

1. A total of 12 VOCs analyzed using method 6010B/7470A. All analysis shown.

Table 2
Sullivan's Ledge Superfund Site
Spring 2002 Monitoring Event
Ground Water Data Summary
PCBs1

Constituent	Number of Samples	Number of Detects	Range (µg/L)	
			Low	High
Aroclor 1242/1016	6	4	0.5 U	17 J

Notes:
1. A total of 6 PCB compounds analyzed using method 8082B. Only detected compounds shown.

Table 3
Sullivan's Ledge Superfund Site
Spring 2002 Monitoring Event
Ground Water Data Summary from Recovery Systems1
Volatile Organic Compounds2

Constituent	Number of Samples	Number of Detects	Range (µg/L)	
			Low	High
1,4-Dichlorobenzene	7	0	25U	1200U
Benzene	7	3	50U	360
Chlorobenzene	7	2	50U	260
Ethylbenzene	7	5	50U	1000
Naphthalene	7	0	25U	1200U
Toluene	7	3	75U	860
Trichloroethene	7	6	5U	12000
Vinyl chloride	7	6	10U	1700
cis-1,2-Dichloroethene	7	6	5U	22000
o-Xylene	7	0	5U	250U
m,p-Xylenes	7	1	50U	11
trans-1,2-Dichlorethene	7	0	7.5U	380U

Notes:

1. Samples collected from shallow collection trench and bedrock recovery wells BEI-1, BEI-2, BEI-3, OB
2. A total of 12 VOCs analyzed using method 6010B/7470A. All analysis shown.

Table 4
Sullivan's Ledge Superfund Site
Spring 2002 Monitoring Event
Ground Water Data Summary from Recovery Systems[1]
PCBs[2]

Constituent	Number of Samples	Number of Detects	Range (µg/L)	
			Low	High
Aroclor 1242/1016	7	5	0.5U	22.0
Aroclor 1254	7	3	0.5U	108.0

Notes:
1. Samples collected from shallow collection trench and bedrock recovery wells BEI-1, BEI-2, BEI-3. OBG-1, OBG-2, and OBG-3.
2. A total of 6 PCB compounds analyzed using method 8082B. Only detected compounds shown.

Table 5
Sullivan's Ledge Superfund Site
Spring 2002 Monitoring Event
Ground Water Data Summary from Recovery Systems[1]
Metals[2]

Constituent	Number of Samples	Number of Detects	Range (mg/L)	
			Low	High
Aluminum	7	1	0.1U	0.25
Barium	7	7	0.1	1.8
Chromium (total)	7	1	0.01U	0.01
Copper	7	1	0.01U	0.07
Iron	7	7	2.0	120.0
Lead	7	3	0.005U	0.022
Vanadium	7	0	0.01U	0.01U
Zinc	7	1	0.05U	0.82

Notes:
1. Samples collected from shallow collection trench and bedrock recovery wells BEI-1, BEI-2, BEI-3, OBG-1, OBG-2, and OBG-3.
2. A total of 8 metal compounds analyzed using method 6010B/7470A. All analysis shown.

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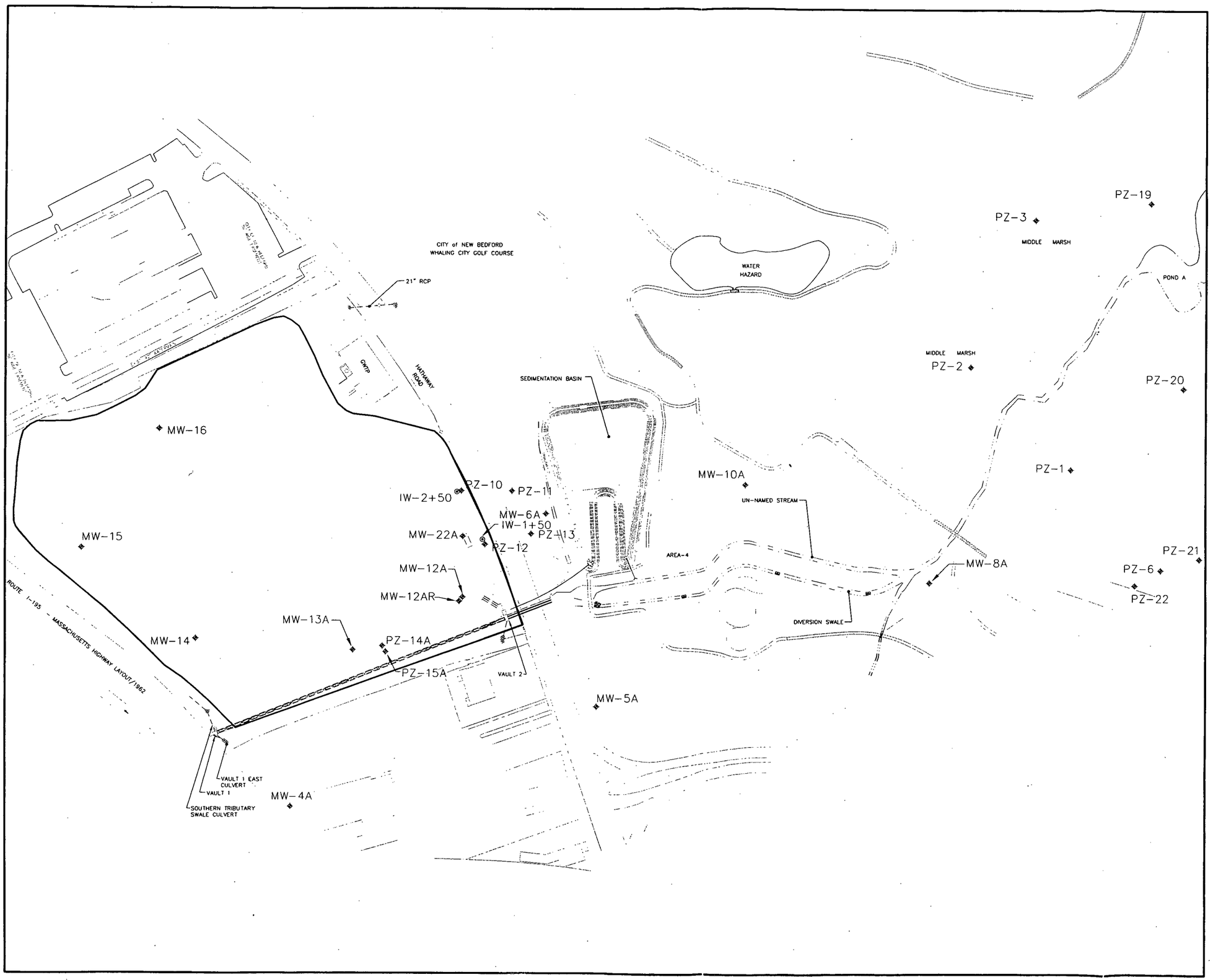
PLOT DATE: 6/13/02

FIGURE–1



LEGEND

- MONITORING WELL LOCATION
- RECOVERY WELL LOCATION

ELEVATIONS IN FEET RELATIVE TO MEAN SEA LEVEL

SULLIVAN'S LEDGE SUPERFUND SITE
NEW BEDFORD, MASS.

OVERBURDEN WELL LOCATION MAP

200 0 200

SCALE IN FEET

FILE NO. 5509.005–002
AUGUST 2001

O'BRIEN & GERE ENGINEERS INC.

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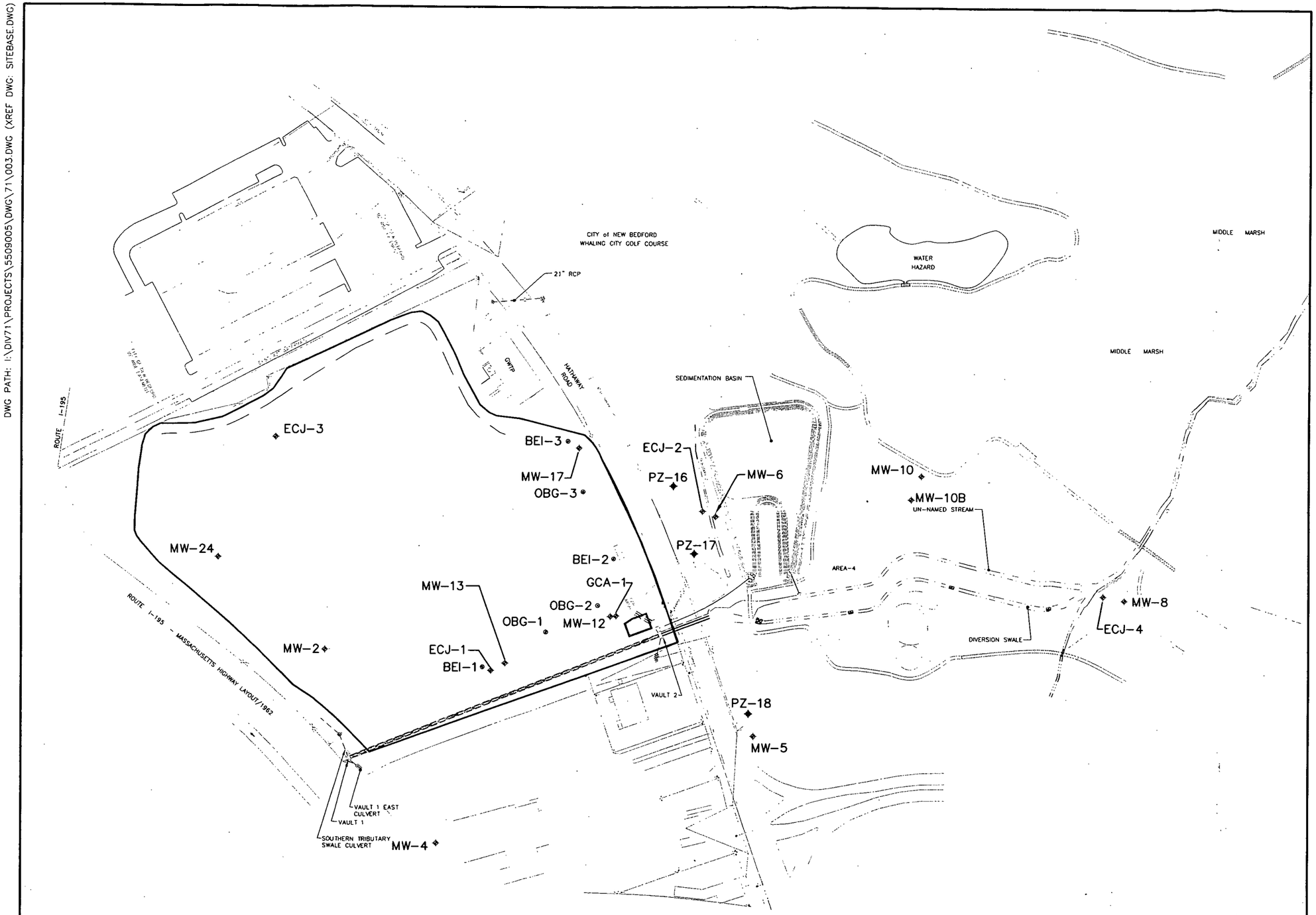
PLOT DATE: 6/13/02

FIGURE-2



LEGEND

- MONITORING WELL LOCATION
- RECOVERY WELL LOCATION

ELEVATIONS IN FEET
RELATIVE TO MEAN SEA
LEVEL

SULLIVAN'S LEDGE
SUPERFUND SITE
NEW BEDFORD, MASS.

SHALLOW BEDROCK WELL LOCATION MAP

200 0 200
SCALE IN FEET

FILE NO. 5509.005-003
AUGUST 2001

OBRIEN & GERE
ENGINEERS INC.

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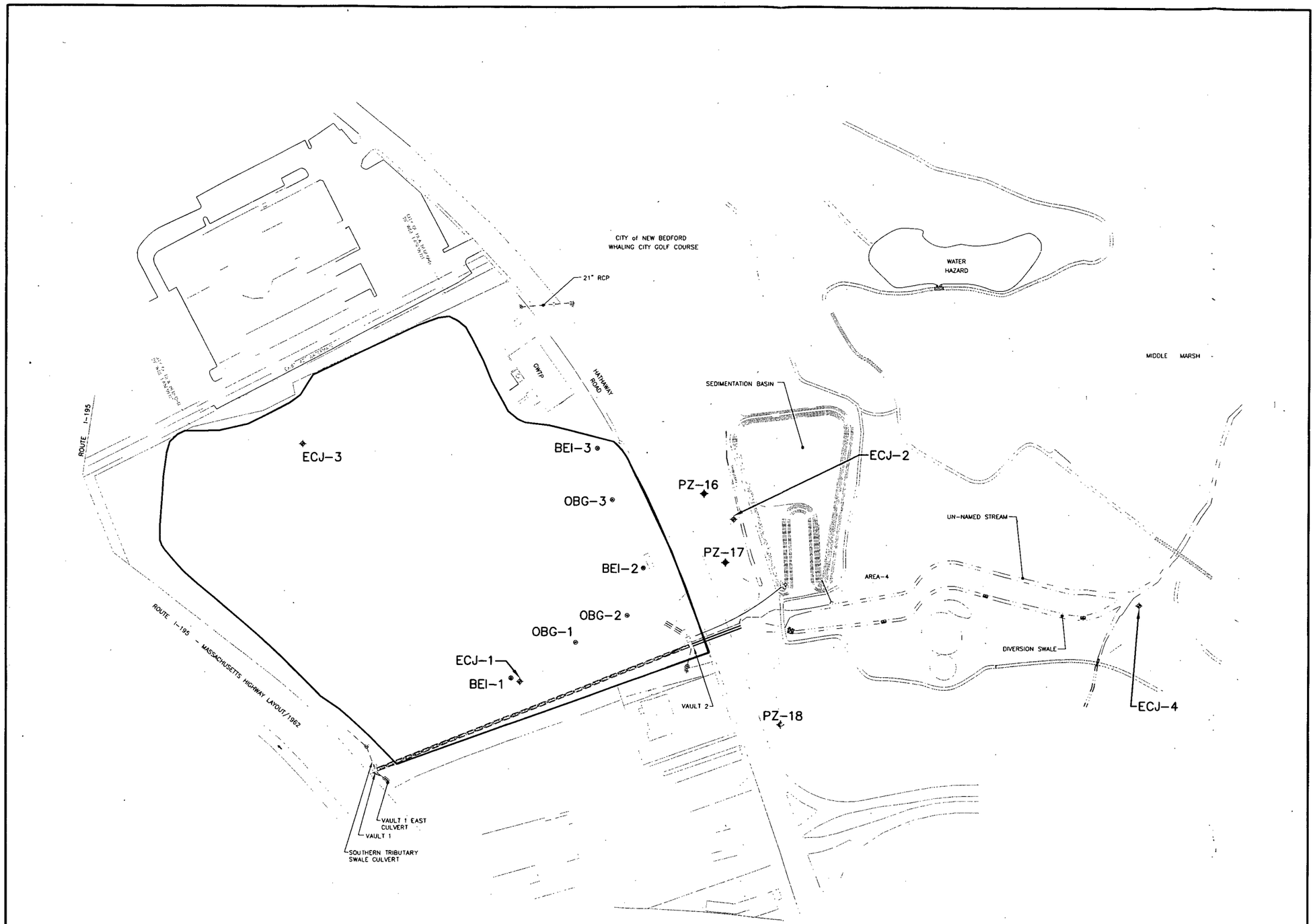
PLOT DATE: 6/13/02

FIGURE-3



LEGEND

- ECJ WELL LOCATION
- RECOVERY WELL LOCATION

ELEVATIONS IN FEET
RELATIVE TO MEAN SEA LEVEL

SULLIVAN'S LEDGE
SUPERFUND SITE
NEW BEDFORD, MASS.

INTERMEDIATE BEDROCK WELL LOCATION MAP

200 0 200

SCALE IN FEET

FILE NO. 5509.005-004
AUGUST 2001

OBRIEN & GERE
ENGINEERS INC.

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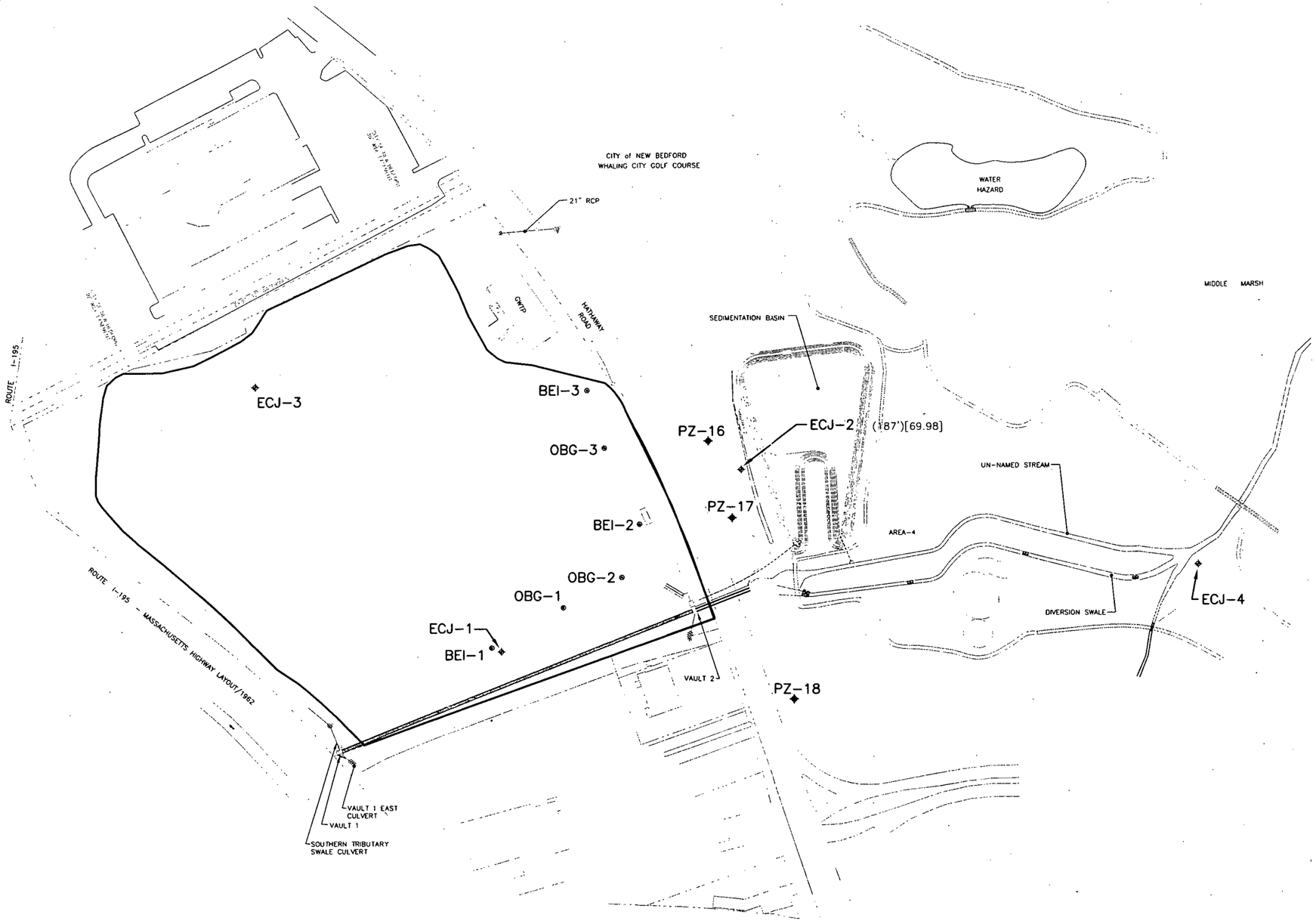

PLOT DATE: 6/13/02

FIGURE-4

LEGEND

- ECJ WELL LOCATION
- RECOVERY WELL LOCATION

ELEVATIONS IN FEET RELATIVE TO MEAN SEA LEVEL

SULLIVAN'S LEDGE
SUPERFUND SITE
NEW BEDFORD, MASS.

DEEP BEDROCK WELL LOCATION MAP

200 0 200

SCALE IN FEET

FILE NO. 5509.005-005
AUGUST 2001

O'BRIEN & GERE ENGINEERS INC.

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PLOT DATE: 6/13/02

FIGURE-5

CITY of NEW BEDFORD
WHALING CITY GOLF COURSE

21" RCP

OWTP

HATHAWAY ROAD

SEDIMENTATION BASIN

WATER HAZARD

MIDDLE MARSH

POND A

MW-16 [99.35]

MW-15 [91.27]

MW-14 [82.95]

MW-13A [72.56]

MW-4A [81.54]

MW-5A [74.23]

PZ-14A

PZ-15A [74.23]

PZ-10 [59.42]

PZ-11 [68.23]

IW-2+50

MW-6A

IW-1+50

PZ-13

PZ-12 [59.54]

MW-22A [58.22]

MW-12A [71.16]

MW-12AR

PZ-3

PZ-19

PZ-2

PZ-20

PZ-1

MW-10A

UN-NAMED STREAM

AREA-4

MW-8A

PZ-21

[63.30] PZ-6

PZ-22

DIVERSION SWALE

VAULT 2

VAULT 1 EAST CULVERT

VAULT 1

SOUTHERN TRIBUTARY SWALE CULVERT

ROUTE I-195 - MASSACHUSETTS HIGHWAY LAYOUT/1962

90 85 80 75 70 65 65 70 75 80 85 90

LEGEND

- MONITORING WELL LOCATION
- RECOVERY WELL LOCATION
- [82.95] GROUND WATER ELEVATION
- 70 EQUIPOTENTIAL CONTOUR LINE (DASHED WHERE INFERRED)

ELEVATIONS IN FEET RELATIVE TO MEAN SEA LEVEL

SULLIVAN'S LEDGE
SUPERFUND SITE
NEW BEDFORD, MASS.

OVERBURDEN WELL GROUND WATER ELEVATION MAP (FEBRUARY 2002)

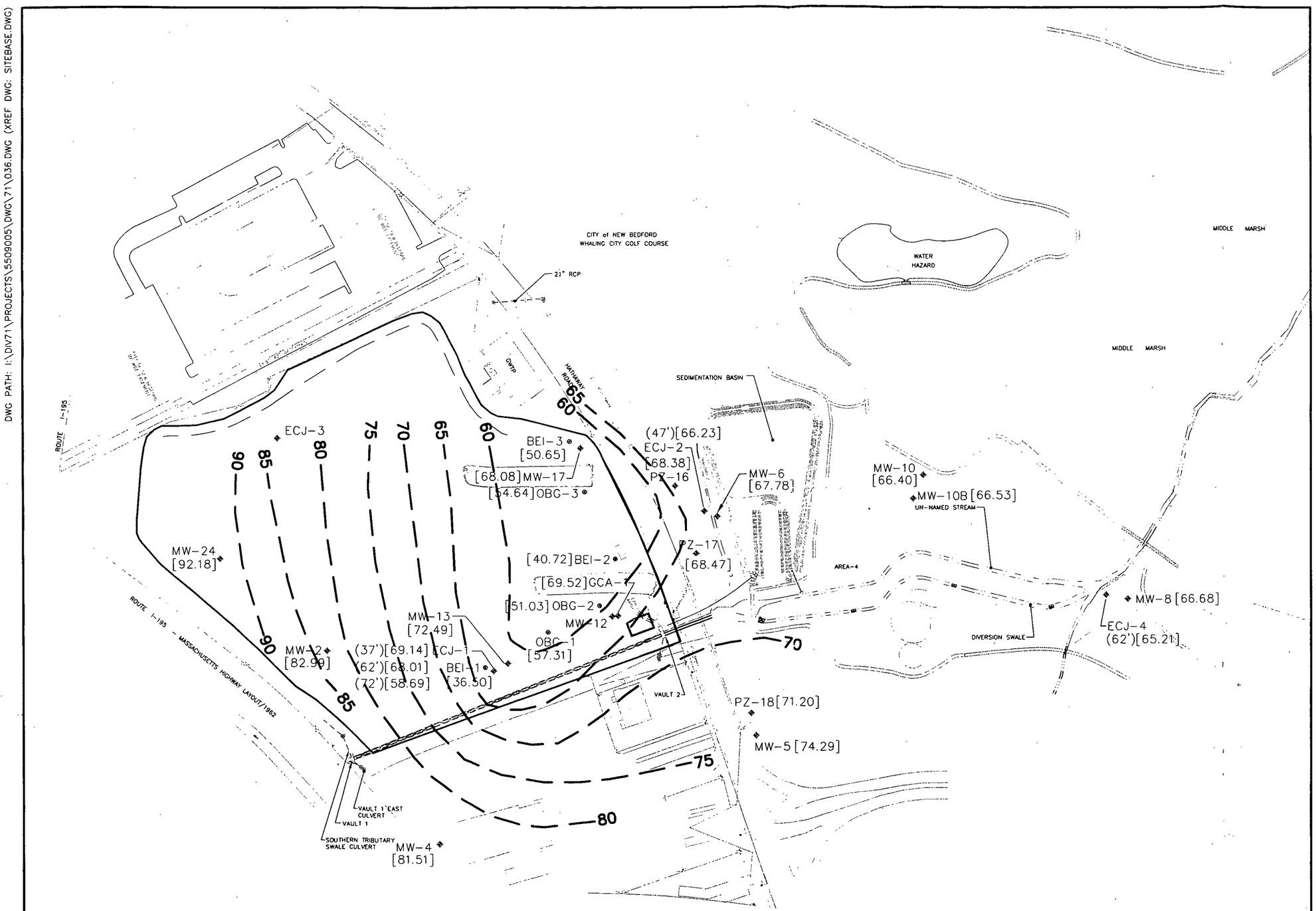
200 0 200

SCALE IN FEET

FILE NO. 5509.005-035
AUGUST 2001

O'BRIEN & GERE ENGINEERS INC.

FIGURE-6



LEGEND

- MONITORING WELL LOCATION
- RECOVERY WELL LOCATION
- [81.51] GROUND WATER ELEVATION
- 70 EQUIPOTENTIAL CONTOUR LINE (DASHED WHERE INFERRED)

ELEVATIONS IN FEET RELATIVE TO MEAN SEA LEVEL

SULLIVAN'S LEDGE SUPERFUND SITE
NEW BEDFORD, MASS.

SHALLOW BEDROCK GROUND WATER ELEVATION MAP (FEBRUARY 2002)

200 0 200
SCALE IN FEET

FILE NO. 5509.005-036
AUGUST 2001

O'BRIEN & GERE ENGINEERS INC.

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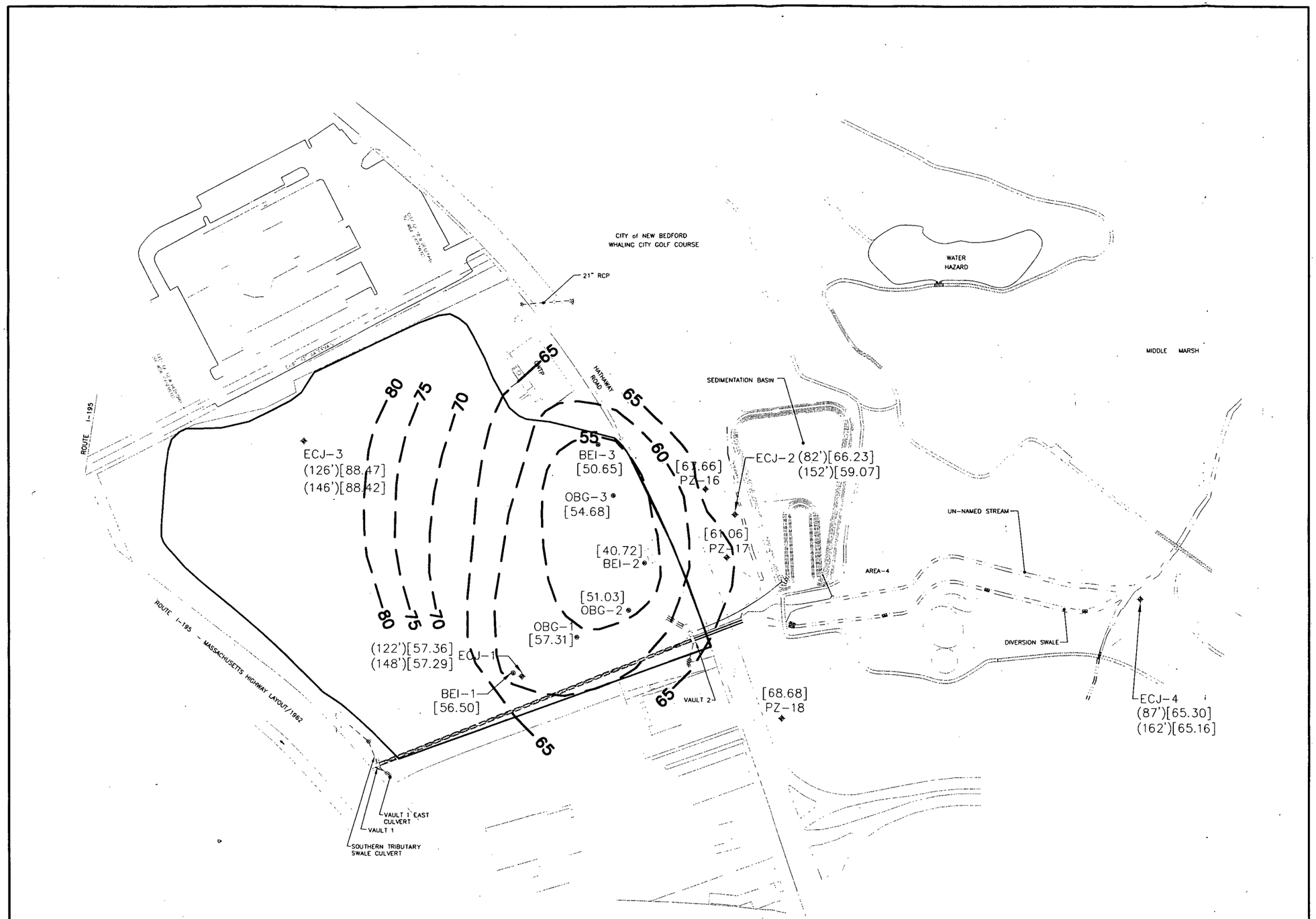
PLOT DATE: 6/13/02

FIGURE–7



LEGEND

- ECJ WELL LOCATION
- RECOVERY WELL LOCATION
- [67.66] GROUND WATER ELEVATION
- 70 EQUIPOTENTIAL CONTOUR LINE (DASHED WHERE INFERRED)

ELEVATIONS IN FEET RELATIVE TO MEAN SEA LEVEL

SULLIVAN'S LEDGE
SUPERFUND SITE
NEW BEDFORD, MASS.

INTERMEDIATE BEDROCK GROUND WATER ELEVATION MAP (FEBRUARY 2002)

200 0 200

SCALE IN FEET

FILE NO. 5509.005–038
AUGUST 2001

OBRIEN & GERE
ENGINEERS INC.

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PLOT DATE: 6/13/02

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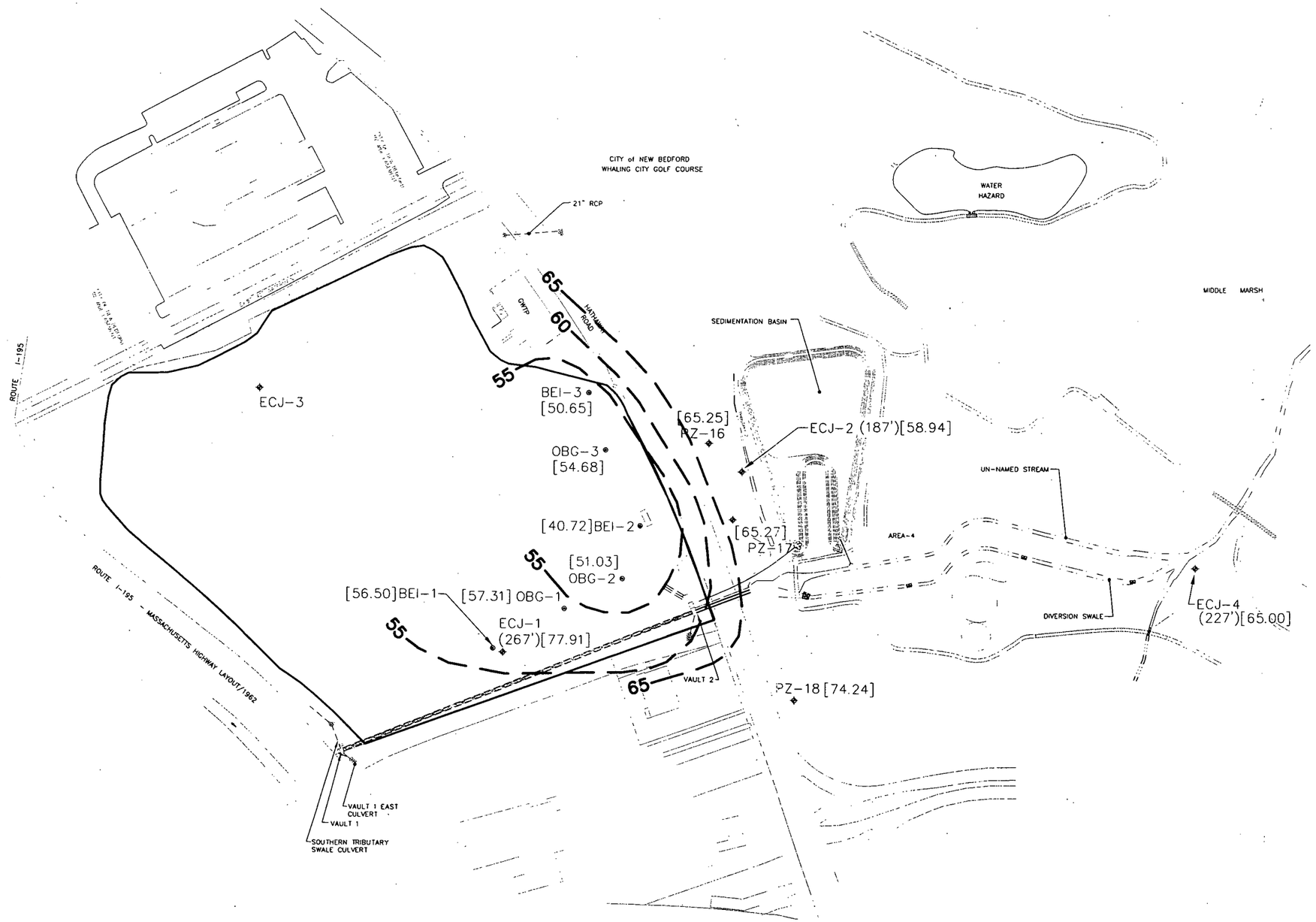

FIGURE-8

LEGEND

- ECJ WELL LOCATION
- RECOVERY WELL LOCATION
- [74.24] GROUND WATER ELEVATION
- 55 EQUIPOTENTIAL CONTOUR LINE (DASHED WHERE INFERRED)

ELEVATIONS IN FEET RELATIVE TO MEAN SEA LEVEL

SULLIVAN'S LEDGE SUPERFUND SITE
NEW BEDFORD, MASS.

DEEP BEDROCK GROUND WATER ELEVATION MAP (FEBRUARY 2002)

200 0 200

SCALE IN FEET

FILE NO. 5509.005-037
AUGUST 2001

O'BRIEN & GERE ENGINEERS INC.

PLOT DATE: 6/13/02

Appendix A

Correspondence

Mabbett & Associates, Inc.
Environmental Consultants & Engineers

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info@mabbett.com
www.mabbett.com

March 14, 2001

Mr. David O. Lederer
Remedial Project Manager
Environmental Protection Agency (HBO)
Region 1
1 Congress Street, Suite 1100
Boston, MA 02114-2023

Re: Sullivan's Ledge Superfund Site
Spring 2001 Groundwater Sampling Event
O'Brien & Gere Engineers, Inc.
Syracuse, NY
Project No. 20015.01

Dear Dave:

On behalf of O'Brien & Gere Engineers, Inc., this letter presents clarifications and modifications to the January 2000 Field Sampling Plan for the Spring 2001 groundwater sampling event at the Sullivan's Ledge Superfund Site, and is consistent with my e-mail to you dated February 26, 2001.

Schedule: The Spring 2001 sampling event is scheduled for the weeks of March 19 and March 26, 2001, consistent with O'Brien & Gere's letter to EPA dated June 26, 2000.

Analytical Scope: The analytical scope for the Spring 2001 round will consist of an annual round. Samples from conventional wells and Westbay well ports will be analyzed for VOCs, PCBs, SVOCs, and metals. The scope of the metals analysis will be increased from RCRA 8 metals to TAL metals. The modifications to the program recommended in O'Brien & Gere's June 26, 2000 letter will not be implemented.

Filtering of Samples for Metals: Samples will be collected for total metals analysis only. As we discussed, this approach is consistent with Massachusetts Contingency Plan Guidance. (See MCP Master Q&A 1993-1997 #Q164 "Water to be collected from a tap should not be filtered, nor should water collected with a low flow sampling pump that is designed to minimize turbidity...").

Laboratory: Laboratory analysis for the project will be completed by Alpha Analytical, Inc. (Alpha). On March 12, 2001, O'Brien & Gere forwarded to EPA Alpha's Laboratory Quality Assurance Manual, and a letter from Alpha dated March 7, 2001 which summarizes laboratory reporting limits and standard laboratory control limits.

ECJ-3: ECJ-3 is the upgradient Westbay well. This well was found plugged during the 1999/2000 sampling event. HLA has indicated that it has removed the blockages, but was unable to remove a 50-ft rod which had been used for clearing from the lower portion of the well (approximately 210 ft from top of casing). At a minimum, the rod will preclude sampling the lower two ports of the well. HLA has been requested to videotape the well, to evaluate well integrity and the potential for getting Westbay sampling equipment hung up in the well. Based on the above, ECJ-3 will not be sampled until the well is videotaped and found to be suitable for sampling. We will keep you apprised of the situation.

Project Organization: Samples will be collected by Mabbett & Associates, Inc. The overall project organization will be as follows:

Title	Name	Firm
Project Coordinator:	James R. Heckathorne, PE	OBG
Project Manager:	James M. O'Loughlin, PE, LSP	M&A
Project Hydrogeologist:	Guy A. Swenson, CPG	OBG
Data Validator:	Melissa S. Listman	OBG
Site Manager:	Melissa A. Smith	M&A
Health & Safety Officer:	Gregory C. Guimond	M&A
Sampling Personnel:	Melissa A. Smith	M&A
	Gregory C. Guimond	M&A
	Darren J. Andrews	M&A
	Ryan E. Hill	M&A
	Theodore A. Nawn	M&A

We appreciated the opportunity to discuss the program with you on March 1, 2001, and look forward to completing it. Please contact Jim Heckathorne or me if we can provide any additional information.

Very truly yours,

MABBETT & ASSOCIATES, INC.

BY:

James M O'Loughlin

James M. O'Loughlin, P.E., LSP
Senior Project Manager

JMO/tw

cc: S. Wood, E. Bertaut, R. Connors, D. Allen, D. Buckley, D. Dwight, R. Carey, J. Johnson, M. Wade, J. Heckathorne, M. Listman, G. Swenson

DJA, GCG, REH , JMO, TAN, MAS, (MF/RF)

df: JEB, DAC, ANM, PDS

J:\USERS\ADMINA\20015\LEDERER-07.DOC

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www.mabbett.com

March 16, 2001

Mr. David O. Lederer
Remedial Project Manager
Environmental Protection Agency (HBO)
Region 1
1 Congress Street, Suite 1100
Boston, MA 02114-2023

Re: Sullivan's Ledge Superfund Site
Health and Safety Plan
O'Brien & Gere Engineers, Inc.
Syracuse, NY
Project No. 20015.01

Dear Dave:

To complete the groundwater, landfill gas, and surface water/sediment sampling at Sullivan's Ledge, Mabbett & Associates, Inc. will be adopting the Health & Safety Plan developed by O'Brien & Gere for that purpose (provided to EPA on July 30, 1999). This plan was reviewed by M&A and found to be acceptable, subject to the following updates and clarifications:

Project Organization (Update to Section 1.4 and Table 1.1)

Title	Name	Telephone
Project Management Committee	Steven B. Wood	401-421-0398
Project Coordinator	James R. Heckathorne, PE	315-437-6100
Project Manager	James M. O'Loughlin, PE	781-275-6050
Technical Director of Environmental Health*	Ronald S. Ratney, Ph.D, CIH	781-275-6050
Site Health and Safety Coordinator	Gregory C. Guimond	781-275-6050
Field Team Leader	Melissa A. Smith	781-275-6050
Field Team Member	Darren J. Andrews	781-275-6050
Field Team Leader	Ryan E. Hill	781-275-6050
Field Team Member	Theodore A. Nawn	781-275-6050

* Will assume duties delineated for Associate for Health and Safety

Protective Equipment (Modification to Sections 2.2 and 4.2)

Gloves: Nitrile inner gloves will be used in place of latex inner gloves.

Boots: For Level D, Modified Level D, and Modified Level C, footwear will consist of leather steel toe boots with rubber overboots. Because site soils have been remediated, and due to the slip hazard associated with mud and snow, disposable outerboots (i.e., tyvek booties) will not be worn.

Respirators: If the during groundwater sampling the concentration of VOCs in the breathing zone is 25 parts per million (ppm) above background, as measured by a PID, the well will be capped and the Project Manager will be contacted before upgrading to full face air purifying respirators with organic vapor cartridges.

Emergency Telephone Numbers (Update to Table 9-1)

Agency	Phone
Ambulance	911
St Lukes Hospital (General)	(508) 997-1515
St Lukes Hospital (Emergency Room)	(508) 961-5388
New Bedford Fire Department	(508) 991-6100
New Bedford Police Department	(508) 991-6340
New Bedford Public Works Department (Robert Carey, City Project Coordinator)	(508) 979-1527
Sullivan's Ledge Groundwater Treatment Plant	(508) 961-3160
U.S. Environmental Protection Agency (David Lederer, USEPA Project Manager)	(617) 918-1325
Massachusetts Department of Environmental Protection (Dorothy Allen, MADEP Project Manager)	(617) 292-5795
State Poison Center	(800) 682-9211
State Police	(617) 523-1212
State Emergency Response	(888) 304-1133
National Emergency Response	(800) 424-8802
Mabbett & Associates, Inc.	(800) 877-6050

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Map to Hospital (Update to Figure 9-1)

An updated map to St Luke's hospital is attached.

Personal Training (Modification to Section 3.2)

Replace text in Section 3.2 with the following:

On-site management and supervisors directly responsible for or who supervise employees engaged in hazardous waste operations must have completed 40 hours of initial training, three days of supervised field experience, and at least 8 additional hours of specialized training.

Medical Surveillance Program (Modification to Section 5.1)

Replace text in Section 5.1 with the following:

All employees who are or may be exposed to hazardous substances or health hazards at or above the established permissible exposure limit, above the published exposure levels for these substances, without regard to the use of respirators, for 30 days or more a year; who wear a respirator for 30 days or more a year; or are injured, become ill or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation are subject to the medical surveillance requirements outlined herein.

Medical examinations and consultations shall be made available by the employer to each employee prior to assignment; at least once every twelve months for each employee covered unless the attending physician believes a longer interval (not greater than biennially) is appropriate; at termination of employment or reassignment to an area where the employee would not be covered if the employee has not had an examination within the last six months; as soon as possible upon notification by an employee that the employee has developed signs or symptoms indicating possible overexposure to hazardous substances or health hazards, or that the employee has been injured or exposed above the permissible exposure limits or published exposure levels in an emergency situation; or at more frequent times, if the examining physician determines that an increased frequency of examination is medically necessary.

For employees who may have been injured, received a health impairment, developed signs or symptoms which may have resulted from exposure to hazardous substances resulting from an emergency incident, or exposed during an emergency incident to hazardous substances at concentrations above the permissible exposure limits or the published exposure levels without the necessary personal protective equipment being used, medical examinations and consultations shall be made available as soon as possible following the emergency incident or development of signs or symptoms and at additional times, if the examining physician determines that follow-up examinations or consultations are medically necessary.

Please contact the undersigned if you have any comments or if we can provide any further information.

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Very truly yours,

MABBETT & ASSOCIATES, INC.

BY:

James M O'Loughlin

James M. O'Loughlin, P.E., LSP
Senior Project Manager

JMO/tw

cc: S. Wood, D. Allen, R. Carey, J. Heckathorne, E. Bertaut, D. Buckley, R. Connors, D. Dwight

DJA, GCG, REH , JMO, TAN, RSR, MAS, (MF/RF)

df: JEB, DAC, ANM, PDS

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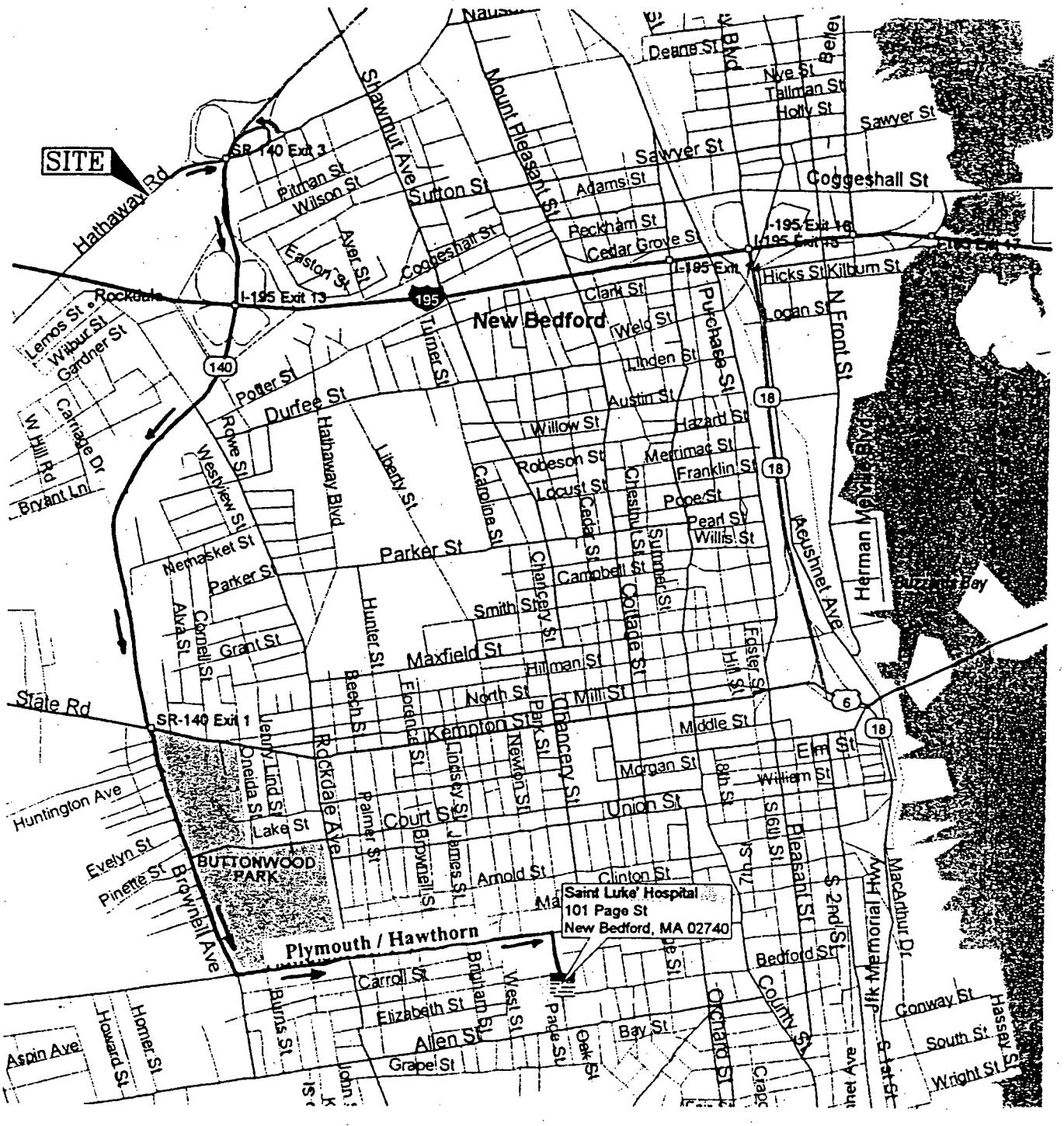

Directions to Saint Luke's Hospital, 101 Page Street, New Bedford, Ma.

Take Route 140 south. Continue straight onto Brownall Avenue, at the 140/Route 6 intersection. Turn left after Buttonwood Park, onto Plymouth. Follow Plymouth for approximately 0.9 miles to Page Street. Turn right onto Page St., and travel 1 1/2 blocks to Saint Luke's Hospital (on your right). The route described also has signs to assist in locating Saint Luke's Hospital.

SULLIVAN'S LEDGE NEW BEDFORD, MASSACHUSETTS	SAINT LUKE'S HOSPITAL DIRECTION MAP	DWG NO. M-1
Mabbett & Associates, Inc. Environmental Consultants & Engineers	SCALE: AS NOTED / DR BY: DJA DATE: 3/15/01 / AP BY: JMO	PROJ NO. 20015.07

February 11, 2002

VIA OVERNIGHT DELIVERY

Mr. David O. Lederer
Remedial Project Manager
Environmental Protection Agency (HBO)
Region 1
1 Congress Street, Suite 1100
Boston, MA 02114-2023

Re: Sullivan's Ledge Superfund Site
2002 Ground Water Monitoring Program

File: 5509.005 #2

Dear Dave:

On behalf of the Sullivan's Ledge Site Group, and consistent with past discussions, O'Brien & Gere is submitting the following proposed sampling plan for the 2002 Groundwater Monitoring Program at the Sullivan's Ledge Superfund Site, which represents a revision of the 2001 program, and is based upon a review of the data from the 2001 program and the substantial data from past groundwater sampling programs at the site.

Paragraph V.C.2.of the Statement of Work (SOW) describes requirements for compliance groundwater monitoring. A baseline round of groundwater monitoring was conducted at the site in the winter of 1999 / 2000, to coincide with the start-up of the groundwater treatment plant. Rounds of groundwater sampling were also conducted in Spring 2001, Summer 2001, Fall 2001, and Winter 2001. Based on these and previous rounds of sampling, as well as data obtained during groundwater treatment plant start-up and operation, O'Brien & Gere is writing this letter to propose a revised groundwater sampling plan for three quarterly events beginning in March 2002 and the annual sampling event. This request is consistent with Paragraph V.C.2.h of the SOW, which states:

> *"On its own initiative or at the request of Settling Defendants, EPA, in consultation with DEP, may add or delete specific parameters, monitoring wells, or zones and may adjust monitoring frequencies and requirements for water level measurements, depending on sample results and observed trends."*

The proposed plan and rationale are presented in Attachment A. Elements of the proposed plan were discussed with EPA on May 12, 2000 and June 17, 2001, and have been presented in letters dated June 26, 2000 and May 18, 2001. In general, during the annual sampling event, 43 monitoring wells and 7 recovery points will be sampled for VOCs, PCBS, and 8 metals of environmental significance. In addition, during the annual sampling event, a composite influent sample to the GWTP will be sampled for SVOCs. During the quarterly events, a total of 17 monitoring wells and 7 recovery points will sampled. The monitoring wells will be sampled for VOCs (24 locations) and PCBs (5 locations). The 7 recovery points will be sampled for VOCs, PCBs, and 8 metals of environmental significance.

The following schedule is proposed for the program:

Quarterly Event	March 11 – 22, 2002
Quarterly Event	June 10 – 21, 2002
Quarterly Event	September 9 – 20, 2002
Annual Event	December 2 – 13, 2002

The events generally coincide with a quarterly schedule, with some allowance for holidays and winter. The annual event is scheduled for winter, consistent with the 1999 / 2000 baseline sampling event and the Winter 2001 sampling event, to facilitate historical comparisons.

Please contact me if you have any questions concerning this letter.

Very truly yours,

O'BRIEN & GERE ENGINEERS, INC

James R. Heckathorne, PE
Vice President

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Attachment

cc: S. Wood, E. Bertaut, R. Connors, E. Vaughan, D. Dwight, J. O'Loughlin, G. Swenson

Sullivan's Ledge Superfund Site
2002 Groundwater Sampling Program
Attachment A

I. MONITORING WELLS

A. 2002 Annual Sampling Event

1. Overview

Table 1 presents monitoring wells and recovery systems to be sampled during the 2002 annual sampling event. The locations of these monitoring wells and recovery systems are shown on Figure 1. The program is discussed in greater detail below.

2. Overburden Monitoring Wells

As shown on Table 1, and consistent with the Statement of Work (SOW), all overburden monitoring wells will be sampled during the annual sampling event.

3. Bedrock Monitoring Wells

As shown on Table 1, and consistent with the Statement of Work (SOW), all bedrock monitoring wells will be sampled during the annual sampling event.

4. Westbay Multi-port Bedrock Monitoring Wells

As shown on Table 1, and consistent with the Statement of Work (SOW), all Westbay monitoring ports will be sampled during the annual sampling event.

5. Recovery Systems

As shown on Table 1, the six bedrock recovery wells and the shallow collection trench will be sampled during the annual sampling event.

6. Summary

Consistent with the Statement of Work, a total of 43 monitoring wells and 7 recovery points will be sampled during the 2002 annual sampling event.

B. 2002 Quarterly Sampling Events

1. Overview

Table 2 presents monitoring wells and recovery systems to be sampled during the 2002 quarterly sampling events. The locations of these monitoring wells and recovery systems are shown on Figure 2. The program is discussed in greater detail below.

2. Overburden Monitoring Wells

The SOW indicates that after the first four consecutive quarters, sampling of overburden monitoring wells shall be conducted annually. Although not required by the SOW, it is proposed that MW-6A, MW-14, and MW-15 be sampled during the quarterly events in 2002. As shown on Figure 2, MW-6A is immediately across Hathaway Road from the Disposal

Area, while MW-14 and MW-15 are on the upgradient periphery of the Disposal Area. Monitoring these peripheral wells during the quarterly events during 2002 is proposed as a conservative approach to monitor for changes or trends in groundwater quality at the margins of the Disposal Area.

3. Bedrock Monitoring Wells

As shown on Table 2, it is proposed that the following bedrock monitoring wells be sampled on a quarterly basis during 2002: GCA-1, MW-2, MW-6, and MW-24. GCA-1 is a downgradient Disposal Area well which has a significant historical database that may be useful to maintain. MW-6, MW-2 and MW-24 are in nests with MW-6A, MW-14, and MW-15, respectively, and are on the periphery of the Disposal Area. Monitoring these peripheral wells during the quarterly events during 2002 is proposed as a conservative approach to monitor for changes or trends in groundwater quality at the margins of the Disposal Area.

Bedrock monitoring wells MW-8, MW-10, and MW-10B are not proposed for quarterly sampling. These wells are considerably downgradient of the Disposal Area. As shown on Table 3, samples from these wells in Winter 1999 and during four consecutive quarters in 2001 were consistently either non-detect or in the low part per billion range (12.9 – 33.8 ug/l) for total VOCs. Sampling of these wells during annual events will be sufficient to track changes, if any. It should also be noted that overburden well MW-6A, bedrock well MW-6, and Westbay well ECJ-2 are between the Disposal Area and these wells, and will be sampled during the quarterly events. Similarly, MW-4 and MW-5 are not proposed for quarterly sampling. These wells are cross gradient of the Disposal Area, and have shown very consistent concentrations of VOCs over the last five sampling events, as shown on Table 3.

Bedrock monitoring wells MW-13, MW-16, and MW-17 are not proposed for quarterly sampling. MW-16 is on the extreme upgradient side of the Disposal Area; as shown on Table 3, total VOCs in this well have consistently been either non-detect or in the low part per billion range (0.62 – 5.1 ug/l). Similarly, the concentrations of total VOCs in MW-13 and MW-17 over the last four consecutive quarters have been low, ranging from 21.6 to 26 ug/l, and 1.2 to 28.8 ug/l, respectively. Sampling of these wells on a quarterly basis will be sufficient to track changes, if any.

4. Westbay Multi-port Bedrock Monitoring Wells

As shown on Table 2, it is proposed that the following Westbay ports be sampled during the quarterly events: ECJ-1 (37), ECJ-1 (62), ECJ-1 (72), ECJ-1 (122), ECJ-1 (148), ECJ-2 (47), ECJ-2 (82), ECJ-2 (117), ECJ-2 (152), and ECJ-2 (187). These ports are either on the Disposal Area, or are immediately downgradient of the Disposal Area.

The ports in Westbay well ECJ-3 are not proposed for quarterly sampling. Similar to MW-16, this well is on the extreme upgradient side of the site. As shown on Table 3, total VOCs in the ports in this well during the Winter 1999 baseline round and four quarterly rounds in 2001 have consistently been either non-detect or in the low part per billion range (0.64 – 15 ug/l). Sampling of the ports in this well during the annual events will be sufficient to track changes, if any.

The ports in Westbay well ECJ-4 are not proposed for quarterly sampling. Similar to MW-8, MW-10, and MW-10B, this well is considerably downgradient of the Disposal Area. As shown on Table 3, samples from the ports in this well in Winter 1999 and during four consecutive quarters in 2001 were consistently in the low part per billion range for total VOCs. Sampling of these wells during the annual events will be sufficient to track changes, if any. It should be noted that overburden well MW-6A, bedrock well MW-6, and Westbay well ECJ-2 are between the Disposal Area and this well, and will be sampled during the quarterly events.

Westbay port ECJ-1 (267) is not proposed for quarterly sampling. As shown on Table 3, this very deep port (approximately 120 ft deeper than the next deepest port in the well) has consistently had relatively low concentrations of total VOCs (37.5 to 160.5 ug/l). Over the past four quarters, the concentrations have been even more consistent, ranging from 37.5 to 52.5 ug/l, with a standard deviation less than 8 ug/l. Sampling of this port during annual events will be sufficient to track changes, if any.

5. Recovery Systems

As shown on Table 1, the six bedrock recovery wells and the shallow collection trench will be sampled during the quarterly sampling events.

6. Summary

The SOW would require that a total of 36 points (i.e., 35 monitoring points plus 1 recovery point) be sampled during quarterly events. The program described above requires that a total of 24 points be sampled (i.e., 17 monitoring points plus 7 recovery points). The proposed program represents a modest revision / re-allocation of sampling resources, based on data from five recent rounds (1999 / 2001) of groundwater sampling.

II. ANALYTICAL PROGRAM

A. Annual Program

1. VOCs

As shown on Table 1, and consistent with the SOW, during the annual program, all overburden wells, bedrock wells, Westbay wells, and recovery points will be analyzed for VOCs. Paragraph II.C.2, below, describes the proposed analytical method and constituents to be reported.

2. PCBs

As shown on Table 1, and consistent with the SOW, during the annual program, all overburden wells, bedrock wells, Westbay wells, and recovery points will be analyzed for PCBs. Paragraph II.C.3, below, describes the proposed method to be used for PCB analysis.

3. Metals

As shown on Table 1, and consistent with the SOW, during the annual program, all overburden wells, bedrock wells, Westbay wells, and recovery points will be analyzed for metals. Paragraph II.C.4, below, describes proposed analytical methods as well as the 8 metals proposed for analysis.

4. SVOCs

As described in Section V.C.2. of the 1990 SOW, ground water sampling for Semi-Volatile Organic Compounds (SVOCs) is to be performed annually in overburden wells and bedrock wells after the first year. However, data collected since 1990 indicates that this approach is overly conservative and will result in the generation of data that has little use. Specifically:

- As discussed in the EPA-approved Preliminary Design Report, SVOCs have historically been detected in site ground water infrequently and in relatively low concentrations. From 1985 to 1993, fifty-one wells were sampled for SVOCs on multiple occasions, and of those wells sampled, results indicated that only five compounds were detected above CLP contract required quantitation limits (CRQLs) in more than 5% of the samples. Also, SVOCs were detected in areas where locally higher VOC concentrations were detected.

- Results for SVOCs from the 1999 / 2000 baseline sampling event and the Spring 2001 sampling event are consistent with the results from previous rounds of sampling. As shown in Table 4, SVOCs from the 1999 / 2000 baseline sampling event and Spring 2001 sampling event continue to make-up only a small fraction of the total organic compound concentrations detected in monitoring wells.

- The six bedrock recovery wells and the shallow groundwater collection trench were sampled for SVOCs twice during GWTP start-up, and twice during post start-up operation, as shown on Table 5. Data from the four rounds of GWTP influent monitoring indicate a total SVOC concentration ranging from non-detect to 371 ug/L, well below New Bedford pretreatment standards. As shown on Table 5, SVOCs make up a small fraction of the total organic loading to the GWTP. The concentrations of SVOCs at the recovery points have also been remarkably consistent over time.

- As shown on Table 6, sample results for SVOCs in the effluent from the GWTP between the period December 1999 and December 2001 have been non-detect for 20 of the 36 samples collected. Fifteen of the sixteen detections ranged from 0.001 mg/l to 0.033 mg/l, and averaged 0.013 mg/l, and were at least two orders of magnitude below the Total Toxic Organic (TTO) discharge limitation of 2.0 mg/l. Even the anomalously high result of 0.150 mg/l in March 2001 was over an order of magnitude below the TTO discharge limitation of 2.0 mg/L.

Although analysis for SVOCs is not proposed for samples from monitoring wells, as a conservative approach, a composite influent sample at the GWTP will be analyzed for SVOCs during the 2002 annual event. As shown on Table 5, the concentrations of total SVOCs in the seven individual sources do not vary significantly, ranging from ND – 13.1

ug/l in BEI-3, to ND – 73 ug/l in the shallow collection trench, to 26 - 371 ug/l in OBG-2. A composite sample will provide adequate data to confirm that SVOCs make up a small fraction of the organic loading to the groundwater treatment plant. Paragraph II.C.5, below, describes proposed the proposed method to be used for SVOC analysis.

5. Summary

During the 2002 annual sampling event, and consistent with the SOW, groundwater samples from 43 monitoring points and 7 recovery points will be analyzed for VOCs, PCBs, and metals. In addition, a composite influent sample at the GWTP will be analyzed for SVOCs during the annual event.

B. Quarterly Program

1. VOCs

As shown on Table 2, all overburden wells, bedrock wells, Westbay wells, and recovery points selected for sampling will be sampled for VOCs during the quarterly events. Paragraph II.C.2, below, describes the proposed analytical method and constituents to be reported.

2. PCBs

As shown on Table 2, all recovery points will be sampled for PCBs during the annual events. In addition, during the quarterly events, the following overburden and bedrock wells will be sampled for PCBs: MW-14, MW-15, MW-24, MW-2, and MW-6A. As shown on Table 3, these are the only wells on the site periphery which exhibited detections of PCBs during the 1999 baseline sampling event or the four consecutive quarterly rounds conducted in 2001. Paragraph II.C.3, below, describes the proposed method to be used for PCB analysis.

As shown on Table 2, a several wells on the Disposal Area, which will be sampled for VOCs during the quarterly events, are not proposed for PCB analysis. These wells include GCA-1 and ECJ-1. Examination of Table 3 indicates that for a collective total of 32 samples from these wells over the last 5 sampling events, 20 have been non-detect for PCBs. As shown on Table 3, when detected, the concentrations of PCBs in these wells are typically many orders of magnitude lower than the concentration of VOCs. Moreover, when detected in these wells, PCB concentrations have been remarkably consistent (e.g., GCA-1, ECJ-1 (37)). As shown on Figure 1, GCA-1 and ECJ-1 are all on the Disposal Area, and up-gradient of groundwater recovery equipment. These wells are proposed for quarterly monitoring for VOCs and annual monitoring for PCBs. Repeated sampling of these wells for PCBs during the quarterly events will provide data of little or no value.

Similarly, as shown on Table 2, several wells outside the Disposal Area, which will be sampled for VOCs during the quarterly events, are not proposed for PCB analysis. These wells include MW-6 and ECJ-2. Since the baseline round in 1999, there have been a collective total of 27 samples from these wells – and PCBs have not been detected. These wells are proposed for quarterly monitoring for VOCs and annual monitoring for PCBs. Repeated sampling of these wells for PCBs during the quarterly events will provide data of little or no value.

3. Metals

As shown on Table 2, all recovery points will be sampled for metals during the quarterly events. Paragraph II.C.4, below, describes proposed analytical methods as well as the 8 metals proposed for analysis. Consistent with the SOW, overburden wells, bedrock wells, and Westbay wells will not be sampled for metals during the quarterly events.

4. SVOCs

Consistent with the SOW, overburden wells, bedrock wells, and Westbay wells will not be sampled for SVOCs during the quarterly events.

5. Summary

Consistent with the SOW, samples from all of the monitoring wells sampled during the quarterly events will be analyzed for VOCs. A total of 17 monitoring wells will be sampled. In addition, samples from 5 monitoring wells on the site periphery which have exhibited detections of PCBs will be analyzed for PCBs during the quarterly events. Finally, samples from 7 recovery points will be analyzed for VOCs, PCBs, and 8 metals during the quarterly events.

C. Analytical Methods and Parameters

1. Overview

The same analytical methods for VOCs, PCBs, metals, and SVOCs are proposed for the 2002 groundwater sampling program as were used during the 2001 program. However, in an effort to streamline data validation and management, it is proposed that the laboratory analyze for and report the results of all method 8260 B compounds, but that only the 13 compounds that have been detected at the site with a reasonable degree of consistency and frequency be validated and presented in the reports. Similarly, it is also proposed that analysis for metals be reduced from the full suite of 23 TAL metals to 8 metals of potential environmental significance that have been detected at the site with a reasonable degree of consistency and frequency. Details concerning the proposed analytical program are presented below.

2. VOCs

Consistent with the 2001 groundwater sampling program, VOCs will be analyzed by method 8260B. However, as discussed above, based on historical data as well as the results from the 1999 / 2000 baseline round and the four consecutive quarters of data in 2001, it is proposed that the list of VOCs to be validated and presented in the reports be limited to those constituents that have been frequently and consistently observed on-site. Specifically, it is proposed that the following constituents be validated and presented:

trichloroethene[(1) (2)]	benzene[(1) (2)]	xylene (ortho)[(1)]
1,2 dichloroethene (cis)[(1) (2)]	toluene[(1)]	1,4 dichlorobenzene
1,2 dichloroethene (trans)[(1) (2)]	ethyl benzene	naphthalene
vinyl chloride[(1) (2)]	xylene (meta)[(1)]	
chlorobenzene[(1)]	xylene (para)[(1)]	

The basis for this list and an explanation of the superscripted notes are presented below.

As shown on Tables 7-1, 7-2, 7-3, and 7-4, the VOCs listed in the first two columns were the only VOCs detected in more than 10% of the samples during any one of the four sampling events. Three other constituents (ortho-xylene, naphthalene, and 1,4 dichloro-benzene) were detected in just under 10% of the samples, and are included with the list as a conservative approach. As shown on Tables 8-1, 8-2, and 8-3, the above constituents have also been the more frequently detected constituents in the influent samples from the groundwater treatment plant.

It should be noted that the above list is more comprehensive than the list of VOC compounds selected as indicator parameters in the 1993 Ground Water Trend Analysis Report (i.e., benzene, toluene, xylene, chlorobenzene, tricholoethene, 1,2 dichloroethene, and vinyl chloride). These compounds are designated by note (1) in the table above. The remedial design was based on this small subset of indicator parameters. It is should also be noted that the 1989 RI Report indicated that an even smaller subset of constituents (i.e., vinyl chloride, trichloroethylene, 1,2-dichloroethene, benzene, and PCBs) represent over 99 percent of the total carcinogenic or non-carcinogenic baseline risks to human health associated with groundwater. These compounds are designated by note (2) above.

A total of 74 VOC compounds were validated and presented in the reports in 2001. Tables 7-1, 7-2, 7-3, and 7-4 indicate that no more than 27 VOC compounds were detected at over 40 monitoring wells during the four consecutive rounds of sampling conducted in 2001. To continuously validate, present, and manage data pertaining to approximately 47 compounds which have never been detected, and another 14 which are only detected in no more than 7% of the samples, is an inappropriate use of resources. The focused approach presented above will provide data which is just as meaningful for site management purposes, and which is much easier to comprehend and use.

3. PCBs

Consistent with the 2001 groundwater sampling program, PCBs will be analyzed by method 8082.

4. Metals

Consistent with the 2001 groundwater sampling program, metals will be analyzed by method 6010B / 7470A. For 2002, however, it is proposed that the following eight metals be analyzed:

aluminum[3][4]	iron[4]
barium[3][4][5]	lead[4][5]
chromium[3][5]	vanadium[3][5]
copper[3][4][5]	zinc[3][5]

The basis for this list and an explanation of the superscripted notes are presented below.

As shown on Tables 9-1, 9-2, 9-3, and 9-4, during the four consecutive sampling rounds conducted in 2001, only the following metals were detected in more than 10% of the samples in any one of the four rounds:

Metals Detected In More than 10% of Samples

calcium	aluminum
iron	barium
magnesium	chromium
manganese	copper
potassium	vanadium
sodium	zinc

As shown on Tables 10-1, 10-2, and 10-3, these metals are also the more frequently detected metals in the influent to the groundwater treatment plant.

As discussed in the 1993 Ground Water Trend Analysis Report, some of these metals have been attributed to chemical weathering of feldspars (sodium, calcium, potassium) and other mafic silicates (magnesium, iron, manganese) These constituents are generally of little environmental significance (e.g., no MCP reportable concentrations or GW-1/GW-2/GW-3 standards) and are not considered useful to monitor. The constituents other than sodium, calcium, potassium, magnesium, iron, and manganese detected in more than 10% of the samples are designated by note (3) in the table above.

Aluminum, barium, copper, iron, and lead are referenced in Section V.A.2 of the SOW for purposes of assessing shallow collection trench groundwater quality. These constituents are designated with note (4) in the above table. Based on statistical analysis, barium, copper, chromium, lead, vanadium, and zinc were shown to display significant inter-well variability in the 1993 Ground Water Trend Analysis Report. These metals are designated by note (5) in the first table in this section.

It should be noted that during the design of the groundwater treatment plant, concern was raised concerning the presence of certain metals in the influent to the groundwater treatment plant, potentially in excess of City of New Bedford pretreatment requirements (e.g., lead and zinc). However, as shown on Table 3, influent samples from the shallow collection trench and six bedrock recovery wells have been collected on 5 or 6 occasions since groundwater

treatment plant start-up, and the concentration of metals in the influent have consistently been well below City of New Bedford pretreatment requirements.

5. SVOCs

Consistent with the 2001 groundwater sampling program, SVOCs will be analyzed by method 8270C.

Table 1
Sullivan's Ledge Superfund Site
2002 Groundwater Sampling Program
Annual Event [1]

Sampling Point	Set	Analysis			
		VOCs[2]	PCBs	Metals [3]	SVOCs
Overburden Monitoring Wells - Inside Disposal Area					
MW-12A	A	X	X	X	
MW-13A	A	X	X	X	
MW-22A	A	X	X	X	
MW-14	B	X	X	X	
MW-15	B	X	X	X	
MW-16	B	X	X	X	
Overburden Monitoring Wells - Outside Disposal Area					
MW-04A	C	X	X	X	
MW-05A	C	X	X	X	
MW-06A	C	X	X	X	
MW-08A	D	X	X	X	
MW-10A	D	X	X	X	
Bedrock Monitoring Wells - Inside Disposal Area					
GCA-1	A	X	X	X	
MW-13	A	X	X	X	
MW-17	A	X	X	X	
MW-24	B	X	X	X	
MW-02	B	X	X	X	
Bedrock Monitoring Wells - Outside Disposal Area					
MW-04	C	X	X	X	
MW-05	C	X	X	X	
MW-06	C	X	X	X	
MW-08	D	X	X	X	
MW-10	D	X	X	X	
MW-10B	D	X	X	X	
Westbay Multiport Bedrock Monitoring Wells					
ECJ 1 - 37	A	X	X	X	
ECJ 1 - 62	A	X	X	X	
ECJ 1 - 72	A	X	X	X	
ECJ 1 - 122	A	X	X	X	
ECJ 1 -148	A	X	X	X	
ECJ 1 - 267	A	X	X	X	
ECJ 2 - 47	C	X	X	X	
ECJ 2 - 82	C	X	X	X	
ECJ 2 - 117	C	X	X	X	
ECJ 2 -152	C	X	X	X	
ECJ 2 - 187	C	X	X	X	
ECJ 3 - 51	B	X	X	X	
ECJ 3 - 91	B	X	X	X	
ECJ 3 - 126	B	X	X	X	
ECJ 3 - 146	B	X	X	X	
ECJ 4 - 62	D	X	X	X	
ECJ 4 - 87	D	X	X	X	
ECJ 4 - 132	D	X	X	X	
ECJ 4 - 162	D	X	X	X	
ECJ 4 - 227	D	X	X	X	
ECJ 4 - 245	D	X	X	X	
Groundwater Recovery Systems					
Shallow Collection Trench		X	X	X	
Bedrock Recovery Wells					
BEI - 1		X	X	X	
BEI - 2		X	X	X	
BEI - 3		X	X	X	
OBG - 1		X	X	X	
OBG - 2		X	X	X	
OBG - 3		X	X	X	
GWTP Composite					X
Summary					
Total Samples		50	50	50	1
QA/QC		5	5	5	0
Duplicate		5	5	5	0
MS		3	3	3	0
MSD		3	3	3	0
Total		66	66	66	1

Analytical Methods

VOCs SW5030/SW8260B	Total Metals	SW/3010/6010B/7470A
PCBs SW3520/SW8082	SVOCs	SW3520/SW8270C

Notes

(1) = Proposed for December 2002
(2) = TCE, 1,2-DCE (cis and trans), vinyl chloride, chlorobenzene, benzene, toluene, ethyl benzene, xylene (o,m,p), 1,4-dichlorobenzene, and napthalene.
(3) = Aluminum, barium, chromium, copper, iron, lead, vanadium, and zinc

Prepared by Mabbett & Associates, Inc. for
O'Brien & Gere Engineers, Inc.

Table 2
Sullivan's Ledge Superfund Site
2002 Groundwater Sampling Program
Quarterly Events [1]

Sampling Point	Set	Analysis			
		VOCs[2]	PCBs	Metals [3]	SVOCs
Overburden Monitoring Wells - Inside Disposal Area					
MW-12A	A				
MW-13A	A				
MW-22A	A				
MW-14	B	X	X		
MW-15	B	X	X		
MW-16	B				
Overburden Monitoring Wells - Outside Disposal Area					
MW-04A	C				
MW-05A	C				
MW-06A	C	X	X		
MW-08A	D				
MW-10A	D				
Bedrock Monitoring Wells - Inside Disposal Area					
GCA-1	A	X			
MW-13	A				
MW-17	A				
MW-24	B	X	X		
MW-02	B	X	X		
Bedrock Monitoring Wells - Outside Disposal Area					
MW-04	C				
MW-05	C				
MW-06	C	X			
MW-08	D				
MW-10	D				
MW-10B	D				
Westbay Multiport Bedrock Monitoring Wells					
ECJ 1 - 37	A	X			
ECJ 1 - 62	A	X			
ECJ 1 - 72	A	X			
ECJ 1 - 122	A	X			
ECJ 1 -148	A	X			
ECJ 1 - 267	A				
ECJ 2 - 47	C	X			
ECJ 2 - 82	C	X			
ECJ 2 - 117	C	X			
ECJ 2 -152	C	X			
ECJ 2 - 187	C	X			
ECJ 3 - 51	B				
ECJ 3 - 91	B				
ECJ 3 - 126	B				
ECJ 3 - 146	B				
ECJ 4 - 62	D				
ECJ 4 - 87	D				
ECJ 4 - 132	D				
ECJ 4 - 162	D				
ECJ 4 - 227	D				
ECJ 4 - 245	D				
Groundwater Recovery Systems					
Shallow Collection Trench		X	X	X	
Bedrock Recovery Wells					
BEI - 1		X	X	X	
BEI - 2		X	X	X	
BEI - 3		X	X	X	
OBG - 1		X	X	X	
OBG - 2		X	X	X	
OBG - 3		X	X	X	
GWTP Composite					
Summary					
Total Samples		24	12	7	0
QA/QC		2	1	1	0
Duplicate		2	1	1	0
MS		1	1	1	0
MSD		1	1	1	0
Total		30	16	11	0

Analytical Methods

VOCs SW5030/SW8260B	Total Metals	SW3010/6010B/7470A
PCBs SW3520/SW8082	SVOCs	SW3520/SW8270C

Notes

(1) = Proposed for March 2002, June 2002, and September 2002
(2) = TCE, 1,2-DCE (cis and trans), vinyl chloride, chlorobenzene, benzene, toluene, ethyl benzene, xylene (o,m,p), 1,4-dichlorobenzene, and napthalene.
(3) = Aluminum, barium, chromium, copper, iron, lead, vanadium, and zinc

Prepared by Mabbett & Associates, Inc. for
O'Brien & Gere Engineers, Inc.

Jim Heckathorne - First quarter 2002 GW sampling

From: "Steve Wood" <swood@essgroup.com>
To: "Dave Lederer (E-mail)" <LEDERER.DAVE@epamail.epa.gov>, "Evelina Vaughn (E-mail)" <evelina.vaughn@state.ma.us>
Date: 3/22/02 2:22PM
Subject: First quarter 2002 GW sampling

Dave - This e-mail is to acknowledge receipt of M&E comments you forwarded with your letter of March 10, 2002 and comments from DEP on the first quarter 2002 ground water sampling round. We have reviewed the comments and note that most pertain to the annual round of sampling which we will address at a later date, as they do not effect this quarterly round. We will modify the sampling plan to add MW-4 as suggested by DEP and analyze for the selected VOCs. With respect to sampling for select VOC's and 8 metals in this round, we note the comments and agree that sampling for total VOC's during the annual round has some merit. However, we do not agree that it is necessary to sample all 23 metals and all VOC's during this quarterly round.

Therefore, we plan to go forward with the sampling program as proposed, with the addition of MW-4

Sampling was originally scheduled for the week of March 11, 2002 but was delayed to allow us time to review the comments. We have rescheduled the sampling to begin on March 26, 2002 and it should continue through the week and possibly continued on the following Monday.

Please feel free to call if you have any comments or questions.

Steve

Steve Wood
Senior Project Manager
Environmental Science Services, Inc.
(401) 421-0398 ext. 130
(401) 421-5731 Fax
(401) 374-0515 Mobile
swood@essgroup.com

CC: "Jim Heckathorne (E-mail)" <HeckatJR@obg.com>

Appendix B

Ground Water Elevation Data

Mabbett & Associates, Inc.
Environmental Consultants & Engineers

achusetts

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-5651
t.com
t.com

February 19, 2002

Mr. James Heckathorne, P.E.
Vice President
O'Brien & Gere Engineers, Inc.
P.O. Box 4873
Syracuse, NY 13221

Re: Sullivan's Ledge Superfund Site
Groundwater Elevation Data
O'Brien & Gere Engineers, Inc.
Syracuse, NY
Project No. 2000015.008

Dear Jim:

Mabbett & Associates, Inc. (M&A) collected groundwater elevation data at the Sullivan's Ledge Superfund Site at the conventional wells, Westbay wells, and recovery points on February 13 and 15, 2002.

Measured depths to groundwater for the conventional wells and the corresponding calculated groundwater elevations are shown on Table 1. Measurements and calculations for the Westbay wells are provided on Table 2. Groundwater elevations for recovery points are provided on Table 3. Groundwater elevations were calculated using survey information provided by HLA on August 10, 2001 and on October 25, 2001.

Please call me if I can provide any further information, or if you have any questions concerning the collected data.

Very truly yours,

MABBETT & ASSOCIATES, INC.

BY:

James M. O'Loughlin, P.E., LSP
Senior Project Manager

JMO/tw

Enclosure: Table 1 – Groundwater Elevations
Table 2 – Westbay Well Groundwater Elevations
Table 3 – Groundwater Elevations – Recovery Points

cc: S. Wood G. Swenson R. Connors E. Bertaut
JMO, MAS (MF/RF)

df: DAC, PDS

J:\USERS\ADMINA\2000015\Heckathorne-62.doc

Table 1
Sullivan's Ledge Superfund Site
Groundwater Elevations - Conventional Wells
February 13, 2002

Well	Top of Casing Elevation	Reference Point	Source	Depth to Water	Date	Groundwater Elevation	Notes
GCA-1	84.06	Plastic Cap	SITEC 08/10/01	14.54	2/13/2002	69.52	(1)
MW-2	101.81	Plastic Cap	SITEC 08/10/01	18.82	2/13/2002	82.99	(1)
MW-4	90.17	Top pipe	SITEC 08/10/01	8.66	2/13/2002	81.51	
MW-4A	90.10	Top of PVC	SITEC 08/10/01	8.56	2/13/2002	81.54	
MW-5	82.79	Top pipe	SITEC 08/10/01	8.50	2/13/2002	74.29	
MW-5A	82.30	Top of PVC	SITEC 08/10/01	8.07	2/13/2002	74.23	
MW-6	73.81	Top pipe	SITEC 08/10/01	6.03	2/13/2002	67.78	
MW-6A	73.54	Top of PVC	SITEC 08/10/01	6.53	2/13/2002	67.01	
MW-7A	66.91	Top of PVC	SITEC 08/10/01	--	2/13/2002		(4)
MW-8	69.97	Top pipe	SITEC 08/10/01	3.29	2/13/2002	66.68	
MW-8A	70.00	Top of PVC	SITEC 08/10/01	3.80	2/13/2002	66.20	
MW-9A	66.53	Top of PVC	SITEC 08/10/01	--	2/13/2002		(4)
MW-10	68.20	Top pipe	SITEC 08/10/01	1.80	2/13/2002	66.40	
MW-10A	70.54	Top of PVC	SITEC 08/10/01	4.49	2/13/2002	66.05	
MW-10B	68.35	Top pipe	SITEC 08/10/01	1.82	2/13/2002	66.53	
MW-12	83.91	Top of PVC	SITEC 08/10/01	--	2/13/2002		(2)
MW-12A	84.15	Top of PVC	SITEC 08/10/01	13.91	2/13/2002	70.24	
MW-12AR	85.04	Top of PVC	SITEC 08/10/01	--	2/13/2002		(6)
MW-13	89.49	Plastic Cap	SITEC 08/10/01	17.00	2/13/2002	72.49	(1)
MW-13A	89.48	Top of PVC	SITEC 08/10/01	16.92	2/13/2002	72.56	
MW-14	101.46	Top of PVC	SITEC 08/10/01	18.51	2/13/2002	82.95	
MW-15	112.31	Top of PVC	SITEC 08/10/01	21.04	2/13/2002	91.27	
MW-16	120.55	Top of PVC	SITEC 08/10/01	21.20	2/13/2002	99.35	
MW-17	92.56	Top of PVC	SITEC 08/10/01	24.48	2/13/2002	68.08	
MW-22A	85.00	Top of PVC	SITEC 08/10/01	--	2/13/2002		(6)
MW-24	112.23	Plastic Cap	SITEC 08/10/01	20.05	2/13/2002	92.18	(1)
PZ-1	66.73	Top of PVC	SITEC 08/10/01	--	2/13/2002		(4)
PZ-2	65.91	Top of PVC	SITEC 08/10/01	--	2/13/2002		(4)
PZ-3	65.91	Top of PVC	SITEC 08/10/01	--	2/13/2002		(4)
PZ-5/WP-5	67.01	Top of PVC	SITEC 08/10/01	--	2/13/2002		(4)
PZ-6	68.06	Top of PVC	SITEC 08/10/01	4.76	2/13/2002	63.30	
PZ-10	85.72	Top of PVC	SITEC 08/10/01	26.30	2/13/2002	59.42	
PZ-11	73.79	Top of PVC	SITEC 08/10/01	5.56	2/13/2002	68.23	
PZ-12	82.46	Top of PVC	SITEC 08/10/01	22.92	2/13/2002	59.54	
PZ-13	73.28	Top of PVC	SITEC 08/10/01	5.18	2/13/2002	68.10	
PZ-West (14A)	86.73	Top of PVC	SITEC 08/10/01	--	2/13/2002		(6)
PZ-East (15A)	85.98	Top of PVC	SITEC 08/10/01	11.75	2/13/2002	74.23	
PZ-16 (Shal)				5.51	2/13/2002		(5)
PZ-16 (Inter)				5.88	2/13/2002		(5)
PZ-16 (Deep)				11.65	2/13/2002		(5)
PZ-17 (Shal)				6.33	2/13/2002		(5)
PZ-17 (Inter)				13.30	2/13/2002		(5)
PZ-17 (Deep)				14.20	2/13/2002		(5)
PZ-18 (Shal)				8.60	2/13/2002		(5)
PZ-18 (Inter)				9.08	2/13/2002		(5)
PZ-18 (Deep)				8.70	2/13/2002		(5)
PZ-19	64.89	Top of PVC	HLA 10/25/01	--	2/13/2002		(4)
PZ-20	65.38	Top of PVC	HLA 10/25/01	--	2/13/2002		(4)
PZ-21	65.48	Top of PVC	HLA 10/25/01	--	2/13/2002		(4)
PZ-22	67.38	Top of PVC	HLA 10/25/01	3.22	2/13/2002	64.16	
ECJ-1	89.81	Top of PVC	SITEC 08/10/01				(3)
ECJ-2	72.31	Top of PVC	SITEC 08/10/01				(3)
ECJ-3	120.74	Top of PVC	SITEC 08/10/01				(3)
ECJ-4	70.59	Top of PVC	SITEC 08/10/01				(3)

Notes:
1. Survey elevation is top of PVC cap associated with low flow equipment; depth to groundwater is from top of casing. As a result, actual groundwater elevation is 0.05 to 0.01 ft lower than shown.
2. No DTW measurement taken. Installed tubing prevents measurement.
3. See Table 2 for information on Westbay wells.
4. No measurement taken.
5. Top of casing not surveyed.
6. Well dry.

Table 2
Sullivan's Ledge Superfund Site
Westbay Well Groundwater Elevations
February 15, 2001

Well	Depth Log (ft)	Depth Cable (ft)	P_i (psi)[1]	P_o (psi)[1]	ΔH (ft)	D_{MP} (ft)[1]	D_z (ft)	E_{MP} (ft)[2]	PL (ft)[3]
ECJ-1	35	40	18.77	24.13	12.36	33.03	20.67	89.81	69.14
ECJ-1	60	65	29.67	34.54	11.23	33.03	21.80	89.81	68.01
ECJ-1	70	75	34.03	34.86	1.91	33.03	31.12	89.81	58.69
ECJ-1	120	124	55.86	56.11	0.58	33.03	32.45	89.81	57.36
ECJ-1	145	150	66.74	66.96	0.51	33.03	32.52	89.81	57.29
ECJ-1	265	272	118.97	128.13	21.13	33.03	11.90	89.81	77.91
ECJ-2	47	47	29.40	33.23	8.84	14.92	6.08	72.31	66.23
ECJ-2	82	82	44.58	48.41	8.84	14.92	6.08	72.31	66.23
ECJ-2	117	117	NM			14.92		72.31	(4)
ECJ-2	152	152	74.02	74.75	1.68	14.92	13.24	72.31	59.07
ECJ-2	187	187	87.92	88.59	1.55	14.92	13.37	72.31	58.94
ECJ-3	51	63	14.75	15.49		71.72			(5)
ECJ-3	91	103	25.11	26.39	2.95	71.72	68.77	120.74	51.97
ECJ-3	126	138	44.90	62.00	39.45	71.72	32.27	120.74	88.47
ECJ-3	146	158	53.59	70.67	39.40	71.72	32.32	120.74	88.42
ECJ-4	62	62	32.19	40.30	18.71	24.09	5.38	70.59	65.21
ECJ-4	87	87	43.06	51.21	18.80	24.09	5.29	70.59	65.30
ECJ-4	132	132	NM			24.09			(4)
ECJ-4	162	162	75.72	83.81	18.66	24.09	5.43	70.59	65.16
ECJ-4	227	228	103.74	111.76	18.50	24.09	5.59	70.59	65.00
ECJ-4	247	244	110.16	129.69	45.05	24.09	-20.96	70.59	91.55

Notes:

1. Measured by Mabbett & Associates.
2. Top of casing provided by HLA on August 10, 2001.
3. Calculated by Mabbett & Associates, Inc. based on procedure provided by Westbay.
4. NM = Not Measured (Unable to latch on to port.)
5. Calculation not completed due to water level in casing below port elevation.

P_i = Pressure reading inside measuring port casing

P_o = Pressure reading outside measuring port casing

$\Delta H = (P_o - P_i)/w$ w=0.4335 psi/ft

D_{MP} = Depth to water inside monitoring port casing (below top of monitoring port)

D_z = Depth to static level for monitoring zone = $D_{MP}-\Delta H$

E_{MP} = Elevation of measuring port casing

PL = piezometric level = $E_{MP}-D_z$

Table 3
Sullivan's Ledge Superfund Site
Groundwater Elevations - Recovery Points

Recovery Point	Top of Casing Elevation	Reference Point	Source	Depth to Water	Date	Groundwater Elevation	Notes
BEI-1	91.40	Top Cover	SITEC 08/10/01	34.90	2/13/2002	56.50	(1)
OBG-1	88.96	Top Cover	SITEC 08/10/01	31.65	2/13/2002	57.31	(1)
OBG-2	85.65	Top Cover	SITEC 08/10/01	34.62	2/13/2002	51.03	(1)
BEI-2	88.06	Top Cover	SITEC 08/10/01	47.34	2/13/2002	40.72	(1)
OBG-3	90.56	Top Cover	SITEC 08/10/01	35.88	2/13/2002	54.68	(1)
BEI-3	92.71	Top Cover	SITEC 08/10/01	42.06	2/13/2002	50.65	(1)
SCTPS	86.02	Top, East Side	SITEC 05/10/99	18.12	2/13/2002	67.90	(2)
IW-E	84.32	Top of Casing	SITEC 08/10/01	26.10	2/13/2002	58.22	
IW-W	88.79	Top of Casing	SITEC 08/10/01	dry	2/13/2002	--	

Notes:
1. Survey elevation is top of cover; depth to groundwater is from top of casing.
   As a result, actual groundwater elevation is 0.05 to 0.01 ft lower than shown.
2. SCTPS = Shallow Collection Trench Pump Station

Appendix C

Conventional Low-flow Ground Water Sampling Logs

Mabbett & Associates, Inc.
Environmental Consultants & Engineers

5 Alfred Circle
Bedford, Massachusetts
01730-2346
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Fax: (781) 275-5651
info@mabbett.com
www.mabbett.com

April 5, 2002

Mr. James Heckathorne, P.E.
Vice President
O'Brien & Gere Engineers, Inc.
P.O. Box 4873
Syracuse, NY 13221

Re: Sullivan's Ledge Superfund Site
Spring 2002 Groundwater Sampling Event
O'Brien & Gere Engineers, Inc.
Syracuse, NY
Project No. 2000015.009

Dear Jim:

Mabbett & Associates, Inc. (M&A) completed the Spring 2002 Groundwater Sampling Event at Operable Unit 1 of the Sullivan's Ledge Superfund Site from March 26, 2002 thru March 29, 2002. A quarterly sampling round was conducted in accordance with the modified field sampling plan (FSP), prepared by O'Brien & Gere Engineers, Inc (OBG) dated February 11, 2002 and subsequently approved by the U.S. EPA subject to some modifications (e.g., inclusion of MW-4). This letter transmits supporting documentation (e.g., field logs) for the program.

Summary of Field Activities

In accordance with the modified FSP and U.S EPA request, a total of eight conventional wells and ten ports from two Westbay wells were sampled during the Spring 2002 groundwater sampling event. Analysis was requested for volatile organic compounds (VOCs; 18 samples) and polychlorinated biphenyls (PCBs; 6 samples). The wells sampled and analytical program requested were based on the specifications in Table 2 (2002 Groundwater Sampling Program; Quarterly Events) of the February 11, 2002 letter.

During the Spring 2002 groundwater sampling, M&A observed no significant changes to the integrity of those wells sampled since the integrity test conducted in February and March 2001.

A round of water levels was collected on March 12, 2002 and documented in a letter to OBG dated March 14, 2002.

Conventional Groundwater Monitoring Wells

A total of eight conventional groundwater monitoring wells were identified, checked for integrity, characterized and sampled in accordance with the modified FSP and the QAPP through the use of a low-flow bladder pump system dedicated to each well.

Prior to sampling, purged groundwater was monitored in a flow-through cell on-site for pH, specific conductivity, temperature, oxidation reduction potential and turbidity, as described in Section 2.5 of the FSP dated January 2000. Monitoring equipment was calibrated and used in accordance with the standards and protocols provided in Section 3.6 of the QAPP.

Following stabilization of parameters, sampling of the conventional wells was completed using procedures described in Section 2.6 of the FSP dated January 2000. Sampling logs are included in Attachment A of this report.

Samples were packed on ice and sent to Alpha Analytical Labs (Alpha) under a Chain of Custody (COC) for analysis in accordance with the schedule prescribed in Table 2. Analytical methods are described in Section 2.1 of the FSP dated January 2000, as amended by the M&A letter dated March 14, 2001 and the U.S. EPA letter dated June 22, 2001. Chain of Custody documentation is included as Attachment C. Trip blanks and temperature blanks were shipped with coolers submitted to the laboratory in accordance with Section 3.5 of the QAPP.

Quality Assurance/Quality Control (QA/QC) samples were also collected in accordance with Section 3.5 of the QAPP and as identified in Table 2. Duplicate sample #2 was collected on March 29, 2002 from MW-2 and MS/MSD samples were collected from MW-14 on March 29, 2002.

Westbay Monitoring Wells

Two Westbay bedrock monitoring wells (ECJ-1 and ECJ-2) were sampled during the Spring 2002 groundwater sampling event. Westbay field logs are provided in Attachment B. In accordance with Section 2.6 of the FSP dated January 2000, groundwater from Westbay ports was directly sampled without prior purging or characterization.

Samples were packed on ice and sent to Alpha under a Chain of Custody for VOC analysis in accordance with the procedures outlined in Section 2.1 of the FSP dated January 2000, as amended by the letter dated March 14, 2001 and the USEPA letter dated June 22, 2001. Chain of Custody documentation is included in Attachment C. Trip blanks and temperature blanks were submitted to Alpha along with the samples, in accordance with Section 3.5 of the QAPP.

QA/QC samples from the Westbay set of samples were also collected. Duplicate #1 was collected from ECJ-1 (62') on March 28, 2002. The MS/MSD samples were collected from ECJ-2 (47') on March 27, 2002. An equipment blank was collected on March 28, 2002.

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Deviations from Field Sampling Plan (FSP)

The following deviations from the FSP were made during the Spring 2002 sampling event:

- As requested by U.S. EPA, bedrock monitoring well MW-4, located outside the disposal area was included in the sampling program. Samples were analyzed for VOCs and PCBs.
- MW-24 exhibited turbidity levels above the desired 5 NTU. Past sampling experience at MW-24 indicated that longer purge times would not reduce turbidity below 5 NTU. The well was purged for a total of 145 minutes, resulting in stabilization of temperature, pH, conductivity, and oxidation reduction potential parameters prior to the collection of samples.
- Air bubbles were observed in the flow-through cell during purging of low flow wells. Corrective actions were taken, including raising the instrument above the well head, reducing curvature of tubing to the flow through cell, and tightening the connections on the PVC cap. Air bubbles in the flow-through cell may have adversely impacted the ability to collect stabilized representative dissolved oxygen readings in certain samples.
- Samples were not collected from the shallow collection trench and six bedrock recovery wells from ports within the groundwater treatment plant. The groundwater treatment plant was not in operation at the time of sampling.

We appreciate the opportunity to continue to support OBG's efforts to serve the Sullivan's Ledge Site Group. Please call me if you have any questions.

Very truly yours,

MABBETT & ASSOCIATES, INC.

BY:

Paul D. Steinberg, P.E., LSP
Associate Director of Site Assessment and Remediation Group
and Senior Project Manager

PDS/tw

Attachments: A – Low Flow Field Sheets
B – Westbay Field Sheets
C – Chain of Custody Documentation

cc: JAD, TLS (MF/RF)
df: DAC, ANM

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Low Flow Ground Water Sampling Log

Date: 3/26/02 | Personnel: MAS/TAD | Weather: Dull, light rain, 40's
Site Name: Sullivans | Evacuation Method: Bladder Pump | Well #: MW-15
Site Location: New Bedford | Sampling Method: Low Flow | Project #: 20000015.009

Well Information:

Depth of Well * _____ ft.
Depth to Water * 20.70 ft.
Length of Water Column _____ ft.

* Measurements taken from
- [ ] Top of Well Casing
- [ ] Top of Protective Casing
- [x] PVC cap (Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column
Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute
Collect readings at every three minute intervals

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
0	20.70	11.04	6.65	971	-145.3	3.94	1.2	700
5	20.85	11.81	6.56	959	-174.2	3.26	1.0	700
10	20.85	11.53	6.55	980	-173.6	3.87	0.65	500
15	20.80	11.01	6.55	987	-166.6	3.55	0.5	250
20	20.79	11.03	6.55	983	-163.9	2.77	0.5	250
25	20.79	10.97	6.54	994	-162.0	3.17	0.4	250
30	20.79	10.95	6.54	969	-161.2	2.75	0.61	250
35	20.79	11.04	6.54	978	-160.5	3.69	0.31	250

Water sample:

Time collected: 13.25

Total volume of purged water removed: 6 gallons

Physical appearance at start
- Color: clear
- Odor: none

Sheen/Free Product: none

Physical appearance at sampling
- Color: clear
- Odor: none

Sheen/Free Product: none

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container ~~ph~~ Analysis
100 ml	Vial	2	N	HCl	VOC's
1 litre	Amber	2	N	None	PCB's

Notes: Oxygen bubbles in YSI flow through cell
OVM = 0.0ppm

Low Flow Ground Water Sampling Log

Date	3-27-02	Personnel	MAS	Weather	cloudy 50°F
Site Name	Sullivan's Ledge	Evacuation Method	Bladder Pump	Well #	MW-10A
Site Location	New Bedford	Sampling Method	Low Flow	Project #	2000015.007

Well information:

Depth of Well * _____ ft.

Depth to Water * 5.25 ft. To Steel Casing

Length of Water Column _____ ft.

* Measurements taken from

- ☐ Top of Well Casing
- ☐ Top of Protective Casing
- ☑ (Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column
Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute
Collect readings at every three minute intervals

Elapsed Time	Depth To Water	Temperature	pH	µS/cm Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
0	5.35	9.03	6.24	987	-78.8	4.22	36.6	700
5	5.34	8.96	6.25	721	-85.4	3.19	12.7	300
10	5.31	8.96	6.26	721	-88.5	2.65	7.51	275
15	5.34	8.95	6.27	732	-91.0	2.76	6.61	275
20	5.35	8.96	6.27	736	-93.2	4.10	3.95	250
25	5.35	8.99	6.27	735	-93.6	1.94	2.73	275
30	5.35	8.99	6.27	735	-94.7	3.08	2.17	250
35	5.36	9.01	6.28	746	-96.1	1.90	1.60	275
40	5.36	9.00	6.28	739	-97.4	2.30	0.97	275
45	5.36	8.98	6.28	738	-97.3	4.11	1.00	250
50	5.36	8.98	6.28	733	-98.0	1.80	0.75	275
55	5.37	8.97	6.29	732	-98.2	4.02	0.64	275
60	5.37	8.97	6.29	739	-98.6	3.13	0.32	275
65	5.38	8.95	6.29	738	-98.1	2.00	0.42	225
~~70~~								

Water sample:

Time collected: 1600

Total volume of purged water removed: ~5 gal

Physical appearance at start		Physical appearance at sampling	
Color	none	Color	none
Odor	none	Odor	none
Sheen/Free Product	none	Sheen/Free Product	none

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
1L	Glass Amber	2	no	none	PCB's
100 mL	Vial	2	no	HCl	VOC's

Air bubbles in supply line DO levels never stable

D.O. ppm ORP

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Low Flow Ground Water Sampling Log

Date	3-28-02	Personnel	TLS MAS	Weather	Breezy Sunny 30's
Site Name	Sullivan's Ledge	Evacuation Method	Bladder pump	Well #	MW-6 (DUP)
Site Location	New Bedford	Sampling Method	Low Flow	Project #	2000015.009

Well information:

Depth of Well * _____ ft.

Depth to Water * 5.00 ft.

Length of Water Column _____ ft.

* Measurements taken from

PVC	Top of Well Casing
	Top of Protective Casing
	(Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column
Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute
Collect readings at every three minute intervals

Elapsed Time	Depth To Water	Temperature (3%)	pH (±0.1 unit)	Conductivity (3%)	Oxidation Reduction Potential ±10 mV	Dissolved Oxygen (mg/l) (10%)	Turbidity (NTU) (10%)	Flow Rate (ml/min).
0.00	5.20	10.38C	6.76	840	-143.3	4.17	0.00	300ml/min
5.0	5.17	10.59	6.59	802	-138.8	1.98	0.00	300
10.0	5.20	10.63	6.59	802	-198.8	3.82	0.00	300
15.0	5.19	10.57	6.61	785	-220.7	49.2*	0.00	300
20.0	5.19	10.66	6.61	806	-225.0	3.61	0.00	300
25.0	5.2	10.60	6.61	793	-229.3	3.95	0.00	300
30.0	5.2	10.64	6.61	806	-235.6	13.8*	0.00	300
35.0	5.2	10.64	6.62	825	-233.8	23.8*	0.00	300
40.0	5.2	10.66	6.62	804	-230.5	19.6*	0.00	300

* Dissolved oxygen readings appear to have been taken in % rather than mg/l!

Water sample:

Time collected: ~~10:15~~ (45) 10:00

Physical appearance at start
- Color: Clear
- Odor: None
- Sheen/Free Product: None

Total volume of purged water removed: ~4.5 gal

Physical appearance at sampling
- Color: Clear
- Odor: None
- Sheen/Free Product: None

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
100ml	Vial	2	N	HCl	VOC's
1 litre	Amber	2	N	None	PCB's

Air bubbles in tubing, DO readings fluctuating slightly

VM = 0.0 ppm

April 25, 1997
Form developed by
O'Brien & Gere Engineers, Inc.

Low Flow Ground Water Sampling Log

	3/28/02	Personnel	MAS/TLS	Weather	SUNNY/BREEZY
	SULLIVAN'S LEDGE	Evacuation Method	Bladder Pump	Well #	MW-24
cation	NEW BEDFORD, MA	Sampling Method	Low Flow	Project #	20000015.009

PAGE 1 OF 2

l information:

epth of Well * _____ ft.

epth to Water * 19.17 ft.

Length of Water Column _____ ft.

* Measurements taken from

PVC	Top of Well Casing
	Top of Protective Casing
	(Other, Specify)

ater parameters: Lower submersible pump slowly through stagnant water column
Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute
Collect readings at every three minute intervals

Elapsed me	Depth To Water	3% Temperature	±0.1 pH	3% Conductivity	Oxidation Reduction ±10 mV Potential	Dissolved Oxygen (mg/l) 10%	Turbidity (NTU) 10%	Flow Rate (ml/min).
0.00	19.17	12.26	6.73	765	-217.8	1.79	0.54	300
5.00	19.40	12.28	6.68	75.6	-209.4	0.79	0.84	300
0.00	19.55	12.08	6.67	718	-193.4	3.38	1.07	300
15.00	19.60	12.09	6.67	731	-192.5	3.48	0.76	300
0.00	19.55	12.07	6.66	727	-191.9	14.3	3.38	300
5.00	19.64	12.05	6.66	739	-187.9	26.7	5.36	300
30.00	19.7	12.04	6.66	722	-186.4	3.67	10.24	300
5.00	19.6	12.00	6.65	695	-191.0	13.2	13.1	300
40.0	19.75	11.99	6.65	675	-194.7	0.87	25.3	300
45.0	19.85	11.97	6.65	695	-194.8	1.46	14.4	300
50.0	19.76	12.21	6.65	734	-193.4	6.1	12.7	250
55	19.65	12.38	6.64	726	-193.1	7.9	11.7	150
60	19.58	12.54	6.64	730	-192.8	7.0	13.2	150
65	19.52	12.51	6.64	72..	-192.1	5.5	16.3	150
70	19.45	12.53	6.63	727	-192.7	5.4	15.2	150
75	19.42	12.61	6.63	719	-193.6	5.4	14.7	150
80	19.39	12.59	6.63	714	-194.2	3.3	16.9	150
85	19.38	12.52	6.63	712	-193.7	4.3		150
Break in purging → rain cont of gas								

er sample:

me collected: _____

Total volume of purged water removed: _____

hysical appearance at start

Color light brown.

Odor slight organic

heen/Free Product none

Physical appearance at sampling

Color _____

Odor _____

Sheen/Free Product _____

ples collected:

ontainer Size	Container Type	# Collected	Field Filtered	Preservative	Container pH

s:

OVM = 1.2 ppm

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Low Flow Ground Water Sampling Log

Date	3/28/02	Personnel	JAD/TLS	Weather	SUNNY, BREEZY
Site Name	SULLIVAN'S LEDGE	Evacuation Method	Bladder Pump	Well #	MW-24
Site Location	~~880~~ NEW BEDFORD, MA	Sampling Method	LOW-FLOW	Project #	2000015.009

PAGE 2 OF 2

Well information:

Depth of Well * _____ ft.
Depth to Water * 19.13 ft.
Length of Water Column _____ ft.

* Measurements taken from

PVC	Top of Well Casing
	Top of Protective Casing
	(Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column
Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute
Collect readings at every three minute intervals

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
0.00	19.1	12.85	6.68	719 us/cm	-196.1	27.3 *	16.1	150
5:00	19.20	12.92	6.62	716	-189.5	16.0 *	14.4	200
:00	19.23	12.56	6.63	700	-188.3	18.9 *	11.7	200
15.00	19.24	12.43	6.63	709	-186.5	15.1 *	11.4	200
:00	19.23	12.35	6.63	704	-184.8	1.25	12.6	200
25:00	19.24	12.28	6.63	691	-184.1	4.65	12.4	200
30:00	19.25	12.33	6.63	689	-182.1	23.2 *	14.8	200
35:00	19.34	12.71	6.63	720	-182.4	1.81	15.5	200
40:00	19.36	12.55	6.63	704	-180.5	12.6 *	19.5	200
45:00	(15) +0-19.32	12.41	6.63	704	-176.5	11.9 *	18.4	200
50:00	19.35	12.41	6.63	709	-176.2	1.08	(13) ~~48.6~~ 16.8	200
55.00	19.35	~~12.46~~	6.64	708	-177.2	1.36	13.6	200
:00	19.33	12.44	6.64	704	-177.8	1.94	14.8	200

* Dissolved oxygen readings appear to have been taken in % rather than mg/l.

Water sample:

Time collected: 1515

Total volume of purged water removed: ~6 gallons — 3 gals

Physical appearance at start
Color: Pale brown
Odor: Organic
Sheen/Free Product: None

Physical appearance at sampling
Color: Pale brown
Odor: Organic
Sheen/Free Product: none

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
40ml	Vial	2	None	HCl	VOC's
1L	Glass Amber	2	ND	none	PCB's

Notes: Oxygen bubbles in YSI flow through cell.

April 25, 1997
Form developed by
O'Brien & Gere Engineers, Inc.

Low Flow Ground Water Sampling Log

Date	3-28-02	Personnel	MHS, JAD	Weather	Dry, 40's
Site Name	Sullivan's Ledge	Evacuation Method	Bladder pump	Well #	GCA-1
Site Location	New Bedford	Sampling Method	Low Flow	Project #	2000015.009

Well information:

Depth of Well * _____ ft.
Depth to Water * 10.82 ft.
Length of Water Column _____ ft.

* Measurements taken from

PVC	Top of Well Casing
	Top of Protective Casing
	(Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column
Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute
Collect readings at every three minute intervals

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
0	10.82	12.12	6.23	936	-150.0	3.25	10.22	375
5	10.39	12.08	6.21	935	-156.4	2.41	10.04	375
10	10.30	12.07	6.21	979	-157.4	1.74	19.1	100
15	10.34	11.53	6.21	958	-155.4	1.47	10.92	200
20	10.32	11.63	6.22	966	-156.5	1.25	8.42	200
25	10.33	11.67	6.22	961	-154.8	1.18	9.38	200
30	10.36	11.73	6.21	964	-155.8	1.03	9.06	200
35	10.38	11.81	6.20	961	-157.1	0.86		350
~~40~~	Changed N_2 gas							
45	10.33	11.42	6.19	967	-155.0	1.17	7.14	150
50	10.34	10.99	6.22	973	-154.7	1.21	4.23	150
55	10.32	11.05	6.22	970	-152.9	1.28	4.25	150
60	10.35	11.11	6.21	974	-152.4	1.27	4.45	150

Water sample:

Time collected: 1900

Total volume of purged water removed: ~5 gal

Physical appearance at start
Color: Clear
Odor: Slightly organic
Sheen/Free Product: none

Physical appearance at sampling
Color: clear
Odor: slight organic
Sheen/Free Product: none

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
1 litre	Vial	2	none	HCl	~2

Oxygen bubbles in the YSI flow through cell

April 25, 1997
Form developed by
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Low Flow Ground Water Sampling Log

Date	3/29/02	Personnel	MAS / JAD	Weather	Sunny, 50's
Site Name	Sullivan's	Evacuation Method	Bladder Pump	Well #	MW-2
Site Location	New Bedford	Sampling Method	Low Flow	Project #	2000015.009

Well information:

Depth of Well * _____ ft.

Depth to Water * 18.31 ft.

Length of Water Column _____ ft.

* Measurements taken from

- _____ Top of Well Casing
- _____ Top of Protective Casing
- PVC Cap. (Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column
Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute
Collect readings at every three minute intervals

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
0	18.41	12.28	6.93	765	-229.3	1.97	5.5	100
5	18.43	12.19	6.94	744	-227.9	1.67	4.82	100
10	18.45	12.12	6.96	705	-228.3	1.30	4.74	100
15	18.45	12.23	6.93	727	-226.5	1.37	5.23	150
20	18.45	11.96	6.92	716	-225.7	0.78	6.35	150
25	18.45	12.24	6.93	724	-226.5	0.78	13.7	150
30	18.46	12.27	6.93	720	-227.8	0.62	11.3	150
35	18.46	12.34	6.93	716	-228.7	0.61	6.56	150
40	18.45	12.22	6.93	716	-227.9	0.61	6.49	150
45	18.45	12.20	6.93	723	-228.3	0.67	6.61	150
50	18.45	12.31	6.93	720	-228.2	0.58	7.32	150
55	18.45	12.20	6.93	724	-228.5	0.51	6.44	150
60	18.45	12.21	6.93	724	-227.7	0.53	1.98	150

Water sample:

Time collected: 10.00

Total volume of purged water removed: 3 gallons

Physical appearance at start

- Color: clear
- Odor: slight organic
- Sheen/Free Product: none

Physical appearance at sampling

- Color: light orange
- Odor: slight organic
- Sheen/Free Product: none.

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container ID
40ml	Vial	2	N	HCl	VOC's
1 liter	Amber	2	N	None	PCB's

Note: Dup 2 (2 VOC's, 2 PCB's) also collected at this well.
Oxygen bubbles in the YSI flow through cell.

Low Flow Ground Water Sampling Log

Date: 3/29/02 | Personnel: MAS/JAD | Weather: Sunny, 50's
Site Name: Sullivans Ledge | Evacuation Method: Bladder Pump | Well #: MW-14
Site Location: New Bedford | Sampling Method: Low Flow | Project #: 2000015.009

Well information:

Depth of Well * _____ ft.
Depth to Water * 17.78 ft.
Length of Water Column _____ ft.

* Measurements taken from
- PVC — Top of Well Casing
- _____ — Top of Protective Casing
- pvc casing — (Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column
Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute
Collect readings at every three minute intervals

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
0	17.82	11.70	6.60	729	-150.8	1.68	1.96	75
5	17.85	11.53	6.47	721	-153.3	1.34	0.61	375
10	17.83	11.65	6.47	731	-155.0	0.86	0.33	300
15	17.85	11.69	6.47	727	-156.0	0.47	0.0	300
20	17.85	11.67	6.47	718	-156.3	0.55	0.0	300
25	17.85	11.82	6.47	729	-156.4	0.67	0.0	350
30	17.85	11.78	6.48	724	-156.6	0.54	0.0	350
35	17.85	11.65	6.48	722	-156.5	0.57	0.0	350
40	17.85	11.61	6.48	723	-157.0	0.53	0.0	350

After sample:

Time collected: 11.30
Total volume of purged water removed: 5 gallons

Physical appearance at start
- Color: clear
- Odor: none
- Sheen/Free Product: none

Physical appearance at sampling
- Color: clear
- Odor: none
- Sheen/Free Product: none

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
100ml	Vial	2	N	HCl	VOC's
1 litre	Amber	2	N	None	PCB's

Notes: MS & MSD also collected for VOC's & PCB's
Periodic bubbling in the YSI Flow through cell

Low Flow Ground Water Sampling Log

Date	3/29/02	Personnel	MAS/TAD	Weather	Sunny, 50's
Site Name	Sullivans	Evacuation Method	Bladder Pump	Well #	MW-04
Site Location	New Bedford	Sampling Method	Low Flow	Project #	20000613.009

Well information:

Depth of Well *		ft.
Depth to Water *	8.05	ft.
Length of Water Column		ft.

* Measurements taken from

PVC	Top of Well Casing
	Top of Protective Casing
	(Other, Specify)

Water parameters: Lower submersible pump slowly through stagnant water column
Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute
Collect readings at every three minute intervals

Elapsed Time	Depth To Water	Temperature	pH	Conductivity	Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
0	8.10	10.74	6.97	340	-161.0	3.16 mg/l	9.0	200
6	8.10	10.93	6.73	496	-165.7	2.09	0.0	200
10	8.10	10.88	6.72	509	-167.7	1.60	0.0	200
15	8.10	10.82	6.71	417	-167.6	1.22	0.8	200
20	Indicator	10.76	6.70	373	-148.6	1.19	0.8	200
26	malfunctioning	10.79	6.69	361	-146.5	1.16	0.8	200
30		10.80	6.68	363	-145.3	1.12	0.0	200
35		10.78	6.68	365	-147.2	1.13	0.0	200

Water sample:
Time collected: 13.45

Physical appearance at start
Color: clear
Odor: none
Sheen/Free Product: none.

Total volume of purged water removed: 2 gallons

Physical appearance at sampling
Color: clear
Odor: none
Sheen/Free Product: none.

Samples collected:

Container Size	Container Type	# Collected	Field Filtered	Preservative	Container pH
100 ml	Vial	2	N	HCl	VOC's
1 Litre	amber	2	N	None	BNB's

Periodic bubbling in the YSI flow through cell.

April 25, 1997
Form developed by
O'Brien & Gere Engineers, Inc.

Appendix D

Westbay Well Sampling Logs

Westbay Instruments Inc.

Groundwater Sampling

Field Data Sheet

Project Sullivans Ledge Location New Bedford Date 3/27/02
Monitoring Well No. ECJ-2 Sampling Zone No. 47' Start Time 14.30 End Time 14.40
Water Level In MP Casing: (start) 14.45 (end) 14.45 Technicians TLS/JAD.
Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation - See Sampling Plan

Run No.	Surface Function Checks						Position Sampler	Sample Collection Checks									Comments
	Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	Pressure in MP ( )	Activate Shoe	Pressure in Zone ( )	Open Valve	Final Zone Pressure ( )	Close Valve	Retract Shoe	Pressure in MP ( )	Volume Retrieved ( )	
1	✓	✓	✓	✓	✓	✓	✓	30.42	✓	33.67	✓	33.66	✓	✓	30.42	0.25	
																	Total Volume 0.25

Field Determinations (Appearance, pH,S.C.,etc.)

VOC's, MS + MSD Taken at 14.35.

Westbay Instruments Inc.

Groundwater Sampling

Field Data Sheet

Project Sullivans Location New Bedford Date 3/27/02
Monitoring Well No. ECJ-2 Sampling Zone No. 32 Start Time 12.30 End Time 12.40
Water Level In MP Casing: (start) 14.35 (end) 14.45 Technicians MAS/JAD
Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation - See Sampling Plan

Run No.	Surface Function Checks						Position Sampler	Sample Collection Checks									Comments
	Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	Pressure in MP ( )	Activate Shoe	Pressure in Zone ( )	Open Valve	Final Zone Pressure ( )	Close Valve	Retract Shoe	Pressure in MP ( )	Volume Retrieved ( )	
1	✓	✓	✓	✓	✓	✓	✓	45.24	✓	49.45	✓	49.26	✓	✓	45.25	0.25	
																	Total Volume 0.25

Field Determinations (Appearance, pH,S.C.,etc.)

VOC sample taken at 12.35

Westbay Instruments Inc.

Groundwater Sampling

Field Data Sheet

Project Sullivans Location New Bedford Date 3/27/02
Monitoring Well No. ECT-2 Sampling Zone No. 117 Start Time 15:05 End Time 15:55
Water Level In MP Casing: (start) 14.40 (end) 14.36 Technicians TAD
Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation - See Sampling Plan

Run No.	Surface Function Checks						Position Sampler	Sample Collection Checks									Comments
	Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	Pressure in MP ( )	Activate Shoe	Pressure in Zone ( )	Open Valve	Final Zone Pressure ( )	Close Valve	Retract Shoe	Pressure in MP ( )	Volume Retrieved ( )	
1	✓	✓	✓	✓	✓	✓	✓	60.00	✓	64.05	✓	64.39	✓	✓	60.36	0.25	
																	Total Volume 0.25

Field Determinations (Appearance, pH,S.C.,etc.)

Have difficulty locating port → feels slack but pressure not entirely stable. Collect sample. ~~After~~ after 2 hours of location
Sample collected at 15:35.

Westbay Instruments Inc.

Groundwater Sampling

Field Data Sheet

Project Sullivans Location New Bedford Date 3/27/02
Monitoring Well No. CC)-2 Sampling Zone No. 152 Start Time 12.00 End Time 12.10
Water Level In MP Casing: (start) 14.36 (end) 14.43 Technicians MAS/JAD.
Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation - See Sampling Plan

Run No.	Surface Function Checks						Position Sampler	Sample Collection Checks									Comments
	Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	Pressure in MP ( )	Activate Shoe	Pressure in Zone ( )	Open Valve	Final Zone Pressure ( )	Close Valve	Retract Shoe	Pressure in MP ( )	Volume Retrieved (L)	
1	-	✓	✓	✓	✓	✓	✓	74.73	✓	80.02	✓	79.09	✓	✓	74.74	0.25	
																	Total Volume_____

Field Determinations (Appearance, pH,S.C.,etc.)

& Samples collected 12.10 (VOC's)

Westbay Instruments Inc.

Groundwater Sampling

Field Data Sheet

Project Sullivan's Ledge Location New Bedford Date 3/27/02
Monitoring Well No. ECJ-2/ Sampling Zone No. 187 / Start Time 11.30 End Time 11.45
Water Level In MP Casing: (start) 14.27 (end) 14.36 Technicians MAS/JAD
Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation - See Sampling Plan

Run No.	Surface Function Checks: Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Position Sampler: Locate port release arm land probe	Sample Collection Checks: Pressure in MP ( )	Activate Shoe	Pressure in Zone ( )	Open Valve	Final Zone Pressure ( )	Close Valve	Retract Shoe	Pressure in MP ( )	Volume Retrieved ( )	Comments
~~1~~	✓	✓	✓	✓	✓	✓	✓	~~88.67~~	✓	~~93.97~~	✓						
1	✓	✓	✓	✓	✓	✓	✓	88.66	✓	93.97	✓	93.09	✓	✓	88.69	0.25	Not in Port
																	Total Volume 0.25

Field Determinations (Appearance, pH,S.C.,etc.)

VOCs sampled 11.45

Westbay Instruments Inc.

Groundwater Sampling

Field Data Sheet

Project Sullivans Location New Bedford Date 3/28/02
Monitoring Well No. EGJ-1 Sampling Zone No. 37 Start Time 11.30 End Time 11.40
Water Level In MP Casing: (start) 31.28 (end) 31.30 Technicians JAD
Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation - See Sampling Plan

Run No.	Surface Function Checks: Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Position Sampler: Locate port release arm land probe	Sample Collection Checks: Pressure in MP ( )	Activate Shoe	Pressure in Zone ( )	Open Valve	Final Zone Pressure ( )	Close Valve	Retract Shoe	Pressure in MP ( )	Volume Retrieved ( )	Comments
1	✓	✓	✓	✓	✓	✓	✓	19.98	✓	25.78	✓	25.77	✓	✓	20.00	0.25	
																	Total Volume 0.25

Field Determinations (Appearance, pH,S.C.,etc.)

VOC Sample taken at 11.35

Westbay Instruments Inc.

Groundwater Sampling

Field Data Sheet

Project Sullivans Location New Bedford Date 3/28/02
Monitoring Well No. EGJ-1 Sampling Zone No. 62' Start Time 10:45 End Time 11:00
Water Level In MP Casing: (start) 31.28 (end) 31.28 Technicians JAD/MAS
Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation - See Sampling Plan

Run No.	Surface Function Checks						Position Sampler	Sample Collection Checks									Comments
	Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	Pressure in MP ( )	Activate Shoe	Pressure in Zone ( )	Open Valve	Final Zone Pressure ( )	Close Valve	Retract Shoe	Pressure In MP ( )	Volume Retrieved ( )	
1	✓	✓	✓	✓	✓	✓	✓	30.90	✓	36.64	✓	36.60	✓	✓	30.93	0.25	
																	Total Volume 0.25

Field Determinations (Appearance, pH,S.C.,etc.)

VOC's sampled at 10:55
Dup 1 collected here

Westbay Instruments Inc.

Groundwater Sampling

Field Data Sheet

Project Sullivans Ledge Location New Bedford Date 3/28/02
Monitoring Well No. EGJ-1 Sampling Zone No. 72 Start Time 10:05 End Time 10:30
Water Level In MP Casing: (start) 31.34 (end) 31.28 Technicians JAD.
Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation - See Sampling Plan

Run No.	Surface Function Checks: Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Position Sampler: Locate port release arm land probe	Sample Collection Checks: Pressure in MP ( )	Activate Shoe	Pressure in Zone ( )	Open Valve	Final Zone Pressure ( )	Close Valve	Retract Shoe	Pressure in MP ( )	Volume Retrieved ( )	Comments
1	✓	✓	✓	✓	✓	✓	✓	33.03	✓	30.32	✓						Not in Port
2	✓	✓	✓	✓	✓	✓	✓	35.28	✓	40.03	✓	40.98	✓	✓	35.30	0.25L	
																	Total Volume 0.25

Field Determinations (Appearance, pH,S.C.,etc.)

VOC's sampled at 10:20

Westbay Instruments Inc.

Groundwater Sampling

Field Data Sheet

Project Sullivans Ledge Location New Bedford Date 3/28/02
Monitoring Well No. EGJ-1 Sampling Zone No. 12 Start Time 10:05 End Time 10:30
Water Level In MP Casing: (start) 31.34 (end) 31.28 Technicians JAD
Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation - See Sampling Plan

Run No.	Surface Function Checks: Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Position Sampler: Locate port release arm land probe	Sample Collection Checks: Pressure in MP ( )	Activate Shoe	Pressure in Zone ( )	Open Valve	Final Zone Pressure ( )	Close Valve	Retract Shoe	Pressure in MP ( )	Volume Retrieved ( )	Comments
1	✓	✓	✓	✓	✓	✓	✓	~~33.03~~	✓	~~36.32~~	✓						Not in Port
2	✓	✓	✓	✓	✓	✓	✓	35.28	✓	40.03	✓	40.98	✓	✓	35.30	0.25L	
																	Total Volume 0.25

Field Determinations (Appearance, pH,S.C.,etc.)

VOC's sampled at 10:20

Westbay Instruments Inc.

Groundwater Sampling

Field Data Sheet

Project Sullivans Ledge Location New Bedford Date 3/28/02
Monitoring Well No. EC J-1 Sampling Zone No. 122 Start Time 9:45 End Time 10:00
Water Level In MP Casing: (start) 81.30 (end) 31.30 Technicians JAD
Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation - See Sampling Plan

Run No.	Surface Function Checks						Position Sampler	Sample Collection Checks									Comments
	Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	Pressure in MP ( )	Activate Shoe	Pressure in Zone ( )	Open Valve	Final Zone Pressure ( )	Close Valve	Retract Shoe	Pressure in MP ( )	Volume Retrieved ( )	
1	✓	✓	✓	✓	✓	✓	✓	5707	✓	62.78	✓	62.72	✓	✓	57.10	0.25	
																	Total Volume 0.25

Field Determinations (Appearance, pH,S.C.,etc.)

VOC's sampled at 9.55

Westbay Instruments Inc.

Groundwater Sampling

Field Data Sheet

Project Sullivan's Location Rev Bedford Date 3/28/02
Monitoring Well No. ECT-1 Sampling Zone No. 1&8 Start Time 9.00 End Time 9.15
Water Level In MP Casing: (start) 31.21 (end) 31.21 Technicians JAD
Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation - See Sampling Plan

Run No.	Surface Function Checks						Position Sampler	Sample Collection Checks									Comments
	Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	Pressure in MP ( )	Activate Shoe	Pressure in Zone ( )	Open Valve	Final Zone Pressure ( )	Close Valve	Retract Shoe	Pressure in MP ( )	Volume Retrieved ( )	
1	✓	✓	✓	✓	✓	✓	✓	67.97	✓	73.63	✓	73.58	✓	✓	68.00	0.25	
																	Total Volume 0.25

Field Determinations (Appearance, pH,S.C.,etc.)

VOC's sampled at 9.15

OVM Reading 0.0 ppm

Appendix E

Spring 2002
Data Validation Report

REPORT

Sullivan's Ledge Superfund Site Ground Water Data Validation Spring 2002 Round

Sullivan's Ledge Project
Management Committee

June 2002

5509/28602

REPORT

Sullivan's Ledge Superfund Site
Ground Water Data Validation
Spring 2002 Round

Sullivan's Ledge Project
Management Committee

James R. Heckathorne, P.E.
Vice President

June 2002

O'BRIEN & GERE
ENGINEERS, INC.

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1. Introduction

Data validation was performed for the ground water samples collected from monitoring wells, recovery wells, and the shallow collection trench at the Sullivan's Ledge Site in New Bedford, Massachusetts between March 26 and April 9, 2002. Mabbett & Associates (M&A) performed sample collection activities. Samples were validated for selected volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), and selected metals.

1.1. General considerations

Validation is a process of determining the suitability of a measurement system for providing useful analytical data. Although the term is frequently used in discussing analytical methods, it applies to all aspects of the process and especially to the samples, their measurement, and the actual data generated. Data validation was preformed in accordance with the applicable quality control outlined in the following documents:

- Field Sampling Plan (FSP) and Quality Assurance Project and Quality Assurance Project Plan (QAPP) First Operable Unit, Sullivan's Ledge Site, New Bedford, Massachusetts (O'Brien & Gere, January 2000) as modified by M&A's letter dated March 14, 2001, Alpha Analytical Laboratory Quality Manual (Alpha Analytical, October 2000, and by O'Brien & Gere's letter dated February 11, 2002).

- Test Methods for Evaluating Solid Wastes: Physical and Chemical Methods, SW-846, Final Update III, (USEPA, December 1996).

- Region I USEPA-New England (NE) Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part II, Volatile/Semivolatile Data Validation Functional Guidelines (USEPA Region I, December 1996).

- USEPA Region I Laboratory Data Validation Functional Guidelines for Evaluation of Inorganic Analyses (USEPA Region I, February 1989).

- USEPA Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A), 540/1-89/002 (USEPA, revised 1992).

The following sections of this document address distinct aspects of the validation process. Section 2 lists the analytical methodology employed in sample analysis. Section 3 lists the data quality assurance/quality control (QA/QC) protocols used to validate the sample data. Specific QA/QC excursions and qualifications performed on the sample data are discussed in Section 4. Data usability with respect to the intended purposes of the data is discussed in Section 5.

2. Analytical methods

Samples were analyzed by Alpha Analytical Laboratories for selected target compounds utilizing the USEPA methods presented in Test Methods for Evaluating Solid Waste (USEPA, December 1996) shown in Table 2.1.

Table 2-1 ***Analytical methods.***

Parameter	Analytical Method
Volatile organic compounds (11 target)	8260B
PCBs	8082
Metals (8 target)	6010B

Source: O'Brien & Gere Engineers, Inc.

Analytical results are presented in Appendix A. The letters found immediately to the right of individual sample results serve to qualify the sample data. When the data validation process identified more than one quality control deficiency, the qualifier added to the sample result represents the cumulative effect of the individual QC excursions. Consistent with the listed guidance document, the following qualifiers may be used during the data validation:

U Indicates that the compound was analyzed for, but was not detected. The quantitation limit is presented and adjusted for dilution. This qualifier is also used when the quantitation limit is raised due to presence of blank contamination.

J Indicates that the detected sample result should be considered approximate. This qualifier is used when the data validation process identifies a deficiency in the data generation process.

UJ Indicates that the detection limit for the analyte in this sample should be considered approximate. This qualifier is used when the data validation process identifies a deficiency in the data generation process.

R Indicates that the previously reported detection limits or sample result was rejected due to a major deficiency in the data generation procedure. The data should not be used for qualitative or quantitative purposes.

3. Data validation protocols

Quality control data were evaluated based on accuracy and precision criteria specified in Section 3.3 of the site-specific FSP and QAPP and Alpha's QM. The following are method specific QA/QC parameters used in the validation of sample data generated for this investigation:

Volatile analyses

- Holding times and sample preservation
- GC/MS tuning criteria
- Initial and continuing calibration
- Blank analysis
- Surrogate recovery
- Internal standard performance
- Matrix spike/matrix spike duplicate (MS/MSD) analysis
- Field duplicate analysis
- Laboratory control sample (LCS) analysis
- System performance
- Target compound identification, quantitation, and reporting limits
- Documentation completeness
- Overall data assessment

PCB analyses

- Holding times and sample preservation
- Initial and continuing calibration
- Degradation criteria for 4,4'-DDT and Endrin
- Pesticide Resolution requirements
- Blank analysis
- Surrogate recovery and retention time shift
- Internal standard performance
- MS/MSD analysis
- Field duplicate analysis
- LCS analysis
- System performance
- Target compound identification, quantitation, and reporting limits
- Documentation completeness
- Overall data assessment

Metals analyses

- Holding times and sample preservation
- Initial and continuing calibration
- Interference check standard analysis
- Blank analysis
- Matrix spike (MS) analysis
- Laboratory duplicate analysis
- Serial dilution analysis
- Field duplicate analysis
- LCS analysis
- Analyte quantitation and reporting limits
- Documentation completeness
- Overall data assessment

In accordance with the QAPP, laboratory control limits were used to assess MS/MSD, LCS, surrogate, and laboratory duplicate data. Field duplicate data were assessed based requirements specified in the QAPP. Based on guidance provided in EPA Region I's validation guidelines (USEPA Region I, November 1988, February 1989, December 1996), analytical data were qualified in the following manner when laboratory control limits were not met:

- If percent recoveries were less than laboratory control limits but greater than ten percent, non-detected and detected results were qualified as approximate (UJ, J).

- If percent recoveries were greater than laboratory control limits, detected results were qualified as approximate (J).

- If percent recoveries were less than ten percent, detected results were qualified as approximate (J) and non-detected results were qualified as rejected (R).

- If relative percent differences (RPDs) for MSDs and laboratory duplicates were outside of laboratory control limits, detected results greater than the laboratory reporting limit were qualified as approximate (J).

- If RPDs were >50% (>$\pm$ 2xMRL for results <5xMRL) for field duplicates, detected results greater than the MRL were qualified as approximate (J).

It should be noted that qualification of data for MS/MSD analyses was performed only when both MS and MSD percent recoveries were outside of laboratory control limits. Qualification of data was not performed if MS/MSD or surrogate recoveries were outside of laboratory control limits due to sample dilution. Additionally, for MS/MSD and field duplicate

excursions for organic analyses qualifications of data was limited for the unspiked sample or the field duplicate pair unless otherwise stated.

4. Data quality evaluation

This section summarizes the QA/QC parameters that met validation criteria and describes qualifications performed on sample data when QA/QC criteria were not met. Samples that required qualification are identified in the following sections by the sample location documented on the field chain of custody record. Equipment and trip blank data were used to assess contamination that may have been introduced during field sampling and sample shipment and were not qualified with respect to QA/QC excursions.

Field chain of custody records were accurate and complete. Samples were received on ice.

A total of eighteen ground water locations were sampled. In addition, seven recovery well and collection trench (ground water treatment plant influent) samples were collected. Field duplicate (ten percent), MS/MSD (five percent), equipment blanks (EB) and trip blanks (TB) were collected at the frequency specified in Section 2.6.6 of the site specific FSP and QAPP. Dedicated sampling equipment was used to collect the ground water samples with the exception of the Westbay wells. An equipment blank was collected from the Westbay sampling equipment as required. Table 4.1 summarizes the field QC samples that were collected.

Table 4-1. ***Field QC sample collection.***

Field Duplicate IDs	MS/MSD ID	Equipment Blank	Trip Blanks
DUP1 = ECJ-1-62' DUP2= MW-2 DUP1 (4/9/02) = BEI-2	ECJ-2-47 MW-14 OBG-2	3/28/02	3/27/02 3/28/02 3/29/02 4/9/02

Table Notes:
1. Trip blanks were identified by date received. A trip blank was present in each sample cooler containing volatile organic samples as required.

Source: O'Brien & Gere Engineers, Inc.

4.1. Volatile organic analyses

Eighteen ground water monitoring well samples, seven ground water treatment plant influent samples (bedrock recovery wells and shallow collection trench), and associated QC samples were analyzed and validated for the following selected volatile organic compounds: vinyl chloride, trichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, chlorobenzene, benzene, ethyl benzene, toluene, total

xylenes, 1,4-dichlorobenzene, and naphthalene. The following QA/QC parameters met validation criteria or did not result in qualification of data:

- Holding times and sample preservation
- GC/MS tuning criteria
- Initial and continuing calibration
- Blank analysis
- LCS analysis
- Internal standard performance
- System performance
- Target compound identification and quantitation
- Documentation completeness

Surrogate recovery. The percent recovery was above laboratory control limits for 4-bromofluorobenzene in sample ECJ-1-62'. This sample was diluted and reanalyzed with compliant surrogate recoveries. However, in order to retain lower detection limits the initial analysis was reported and the detected results were qualified as approximate in sample ECJ-1-62'.

MS/MSD analysis. Relative percent difference (RPD) was outside of laboratory control limits for chlorobenzene in MS/MSD sample MW-14. Therefore, the detected results for chlorobenzene was qualified as approximate (J) in sample MW-14. Laboratory corrective action was not required since LCS recoveries were within control limits.

Target compound reporting limits. Elevated reporting limits were reported for several ground water samples based on sample dilutions performed prior to analysis. Dilutions were performed by the laboratory based on historical data and are documented on the data validation summary tables. Sample dilutions were performed at the appropriate levels.

Overall data assessment. Volatile analyses and QA/QC procedures were performed in accordance with analytical method and QAPP requirements. Volatile data are useable for qualitative and quantitative purposes. Detected results were qualified as approximate for detected volatile organic compounds in sample ECJ-1-62' and for chlorobenzene in sample MW-14 based on minor excursions from surrogate and MS/MSD criteria.

4.2. PCB analyses

Six ground water monitoring wells samples, seven ground water treatment plant influent samples (recovery well and shallow collection trench), and associated QC samples were analyzed and validated for PCBs. The following QA/QC parameters met criteria or did not result in qualification of data:

- Holding times and sample preservation
- Initial and continuing calibration
- Blank analysis
- Surrogate recovery and retention time shift
- Internal standard analysis
- MS/MSD analysis
- Field duplicate analysis
- LCS analysis
- System performance
- Documentation completeness

Target compound identification, quantitation, and reporting limits. Based on 100% review of the data, the laboratory performed identification in accordance with method requirements. For the majority of samples in which PCBs were detected, the laboratory documented that the PCB Aroclors that were identified exhibited an altered pattern. Samples that exhibited altered PCB patterns have been identified in data validation summary tables, included as Appendix A. Based on review of the raw data, peaks were present within retention time windows established for the identified PCB Arcolors on both primary and confirmation columns utilized by the laboratory. The pattern did not match with respect to peak ratios. The Aroclors that were identified by the laboratory represent the closest match. Therefore, additional qualification of data with respect to PCB Aroclor identification was not required.

The internal standard method was utilized for quantitation for primary and confirmation analyses. Based on review of ten percent of the data, PCB Aroclor quantitation was performed in accordance with method requirements. PCB concentrations were above the linear calibration range for samples MW-24 and OBG-1. These samples were diluted and reanalyzed. Detected results were qualified as approximate if the percent difference (%D) was greater than 40% between the reported result and the confirmation result. Table 4.2 is a summary of the data qualified.

Table 4-2. ***Qualification of PCB data: quantitation.***

Sample ID	PCB Aroclor	Comments	Action
MW-24	1242/1016	%D 102%.	J
BEI-3	1254	%D 74%	J
BEI-1	1254	%D 144%	J

Source: O'Brien & Gere Engineers, Inc.

Overall data assessment. PCB analyses and QA/QC procedures were performed in accordance with analytical method and QAPP requirements. PCB data are useable for qualitative and quantitative purposes. Detected PCB results were qualified as approximate in three samples based on minor excursions from quantitation requirements.

4.3. Metal analyses

Seven ground water treatment plant influent samples (recovery well and shallow collection trench) and associated QC samples were analyzed and validated for the following selected metals: aluminum, barium, chromium, copper, lead, iron, vanadium, and zinc. The following QA/QC parameters met criteria or did not result in qualification of data:

- Holding times and sample preservation
- Initial and continuing calibration
- Blank analysis
- Interference check standard analysis
- Matrix spike analysis
- Laboratory duplicate analysis
- Serial dilution analysis
- LCS analysis
- Field duplicate analysis
- Analyte quantitation and reporting limits
- Documentation completeness

Overall data assessment. The laboratory performed metal analyses and QA/QC procedures in accordance with analytical method and QAPP requirements. Metals data are usable for qualitative and quantitative purposes without further qualification.

5. Data usability

Analytical data were validated for samples collected from the Sullivan's Ledge Site in New Bedford, Massachusetts. Ground water samples and ground water treatment plant influent samples were validated for selected volatile organic compounds, PCBs, and selected metals based on accuracy and precision criteria specified in documents referenced in Section 1. When excursions were observed from QA/QC requirements, the analytical data were qualified based on guidance provided in the USEPA Region I validation guidelines (USEPA Region I, November 1988 and December 1996).

There were no rejected data resulting from a major excursion from QA/QC criteria. Minor deficiencies in the data generation process resulted in approximation of some sample data. Approximation of a data point indicates uncertainty in the reported concentration of the analyte, but not its assigned identity. The conservative assumptions used in the development of conclusions based on the analytical data verifies that approximated analytical data adheres to the project data quality objectives. This approach to the use of analytical data is consistent with the guidance presented in the *USEPA Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A), 540/1-89/002* (USEPA, December 1992).

This section summarizes the adherence of the analytical data to the data quality objectives (DQOs) established in the QAPP for precision, accuracy, representativeness, comparability, completeness, and sensitivity. A detailed discussion of the analytes and samples that were qualified is presented in Section 4. Summary tables of validated sample results with data validation qualifiers have been provided in Appendix A of this report.

Data quality objectives were evaluated using percent usability, defined as the percentage of sample results that are usable for qualitative and quantitative purposes.

Precision was assessed from laboratory MSD and field duplicate analyses. Data usability with respect to precision was calculated as 100%. Data were qualified as approximate for chlorobenzene in sample MW-14 based on minor excursion from MSD RPD requirement.

Accuracy was assessed from GC/MS tuning, calibration, surrogate recovery, internal standard performance MS/MSD, and LCS data. Data usability with respect to accuracy was calculated as 100%. A minor excursion from surrogate recovery resulted in the approximation of detected results for volatile organic compounds in sample ECJ-1-62'.

Representativeness was assessed from holding times, sample preservation, blank analysis, target compound identification and quantitation, and sampling and analytical methodologies used. Data usability with respect to representativeness was 100%.

Comparability is a qualitative measure, therefore, usability calculations were not performed. Comparability requirements were met since standard analytical methods, reporting units, reference materials, and data deliverables were utilized by the laboratory.

Sensitivity requirements were met overall. Laboratory reporting limits were elevated for volatile organic compounds in the majority of samples based on the laboratory dilutions performed to obtain concentrations within the linear calibration range. Sample dilutions were performed in accordance with method requirements and were based on historical data.

Data completeness was calculated as 100%, exceeding the 95% requirement established in the QAPP.

Appendix A

Validated Results

O'BRIEN & GERE
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Table 1
Sullivan's Ledge Superfund Site
Ground Water Samples
Method 8260B Volatile Organic Compound Data

	Sample ID	BEI-1	BEI-2	BEI-2 Dup	BEI-3	OBG-1	OBG-2	OBG-3	Collection Trench	MW-2	MW-2 Dup
	SDG ID	L0203390	L0203390	L0203390	L0203390	L0203390	L0203390	L0203390	L0203390	L0203024	L0203024
	Dilution Factor	400	400	400	100	500	100	200	10	20	10
	Sample Date	04/09/2002	04/09/2002	04/09/2002	04/09/2002	04/09/2002	04/09/2002	04/09/2002	04/09/2002	03/29/2002	03/29/2002
	Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Compound	Matrix	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
1,4-Dichlorobenzene		1000 U	1000 U	1000 U	250 U	1200 U	250 U	500 U	25 U	50 U	38
Benzene		200 U	200 U	200 U	50 U	330	360	100 U	180	310	330
Chlorobenzene		200 U	200 U	200 U	50 U	250 U	260	100 U	110	68	70
Ethylbenzene		990	530	560	50 U	1000	100	100 U	12	10 U	5 U
Naphthalene		1000 U	1000 U	1000 U	250 U	1200 U	250 U	500 U	25 U	50 U	25 U
Toluene		860	300 U	300 U	75 U	1200	110	150 U	410	15 U	7.5 U
Trichloroethene		12000	490	410	2200	3100	59	340	5 U	210	220
Vinyl chloride		570	1700	1700	130	800	380	390	10 U	75	75
cis-1,2-Dichloroethene		16000	15000	15000	4200	22000	3200	10000	5 U	260	270
o-Xylene		200 U	200 U	200 U	50 U	250 U	50 U	100 U	5 U	10 U	5 U
m,p-Xylenes		200 U	200 U	200 U	50 U	250 U	50 U	100 U	11	10 U	5 U
trans-1,2-Dichloroethene		300 U	300 U	300 U	75 U	380 U	75 U	150 U	7.5 U	15 U	7.5 U
										923	1003

NOTES: U - not detected, J - estimated value, R - unusable, --- - not analyzed.
Dup - references blind field duplicate sample that was collected. Lab Dup - laboratory duplicate analyses conducted.

Date Printed: 06/10/2002 13:28:25
DBF File: N:\5509\28602\TEMPDATA.DBF
FXP File: N:\5509\28602\TABLEPR.FXP

File Number: 5509.28602

O'BRIEN & GERE ENGINEERS, INC.

Table 1
Sullivan's Ledge Superfund Site
Ground Water Samples
Method 8260B Volatile Organic Compound Data

Compound	Sample ID	MW-4	MW-6	MW-6A	MW-14	MW-15	MW-24	GCA-1	ECJ-1-37	ECJ-1-62	ECJ-1-62 Dup
	SDG ID	L0203024	L0202990	L0202990	L0203024	L0202937	L0202990	L0203024	L0202990	L0202990	L0202990
	Dilution Factor	10	40	1	5	4	100	20	1	10	20
	Sample Date	03/29/2002	03/28/2002	03/27/2002	03/29/2002	03/26/2002	03/28/2002	03/28/2002	03/28/2002	03/28/2002	03/28/2002
	Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
	Matrix	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
1,4-Dichlorobenzene		25 U	100 U	2.9	12 U	13	250 U	50 U	2.5 U	25 U	50 U
Benzene		10	20 U	2.7	91	140	3900	210	1.6	5 U	10 U
Chlorobenzene		5 U	28	31	18 J	20	160	150	7.9	7 J	10 U
Ethylbenzene		5 U	20 U	0.5 U	2.5 U	2 U	50 U	10 U	1.2	5 U	10 U
Naphthalene		25 U	100 U	2.5 U	12 U	15	250 U	50 U	2.5 U	25 U	50 U
Toluene		7.5 U	30 U	0.75 U	3.8 U	3 U	75 U	15 U	1.2	7.5 U	15 U
Trichloroethene		760	20 U	0.5 U	2.5 U	2 U	210	10 U	0.5 U	5 U	10 U
Vinyl chloride		40	1100	47	5 U	4 U	110	150	17	650 J	640
cis-1,2-Dichloroethene		450	3600	50	2.5 U	2 U	220	450	34	500 J	500
o-Xylene		5 U	20 U	0.5 U	2.5 U	2.1	50 U	10 U	0.5 U	5 U	10 U
m,p-Xylenes		5 U	20 U	0.5 U	2.5 U	8.6	50 U	10 U	0.5 U	5 U	10 U
trans-1,2-Dichloroethene		7.5 U	30 U	0.75 U	3.8 U	3 U	75 U	15 U	1.3	7.5 J	15 U
		1260					540		64.2		
							4000				
							40.01				

NOTES: U - not detected, J - estimated value, R - unusable, --- - not analyzed.
Dup - references blind field duplicate sample that was collected. Lab Dup - laboratory duplicate analyses conducted.

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O'BRIEN & GERE ENGINEERS, INC.

Table 1
Sullivan's Ledge Superfund Site
Ground Water Samples
Method 8260B Volatile Organic Compound Data

	Sample ID	ECJ-1-72	ECJ-1-122	ECJ-1-148	ECJ-2-47	ECJ-2-82	ECJ-2-117	ECJ-2-152	ECJ-2-187	EQUIPMENT BLANK	TRIP BLANK
	SDG ID	L0202990	L0202990	L0202990	L0202937	L0202937	L0202937	L0202937	L0202937	L0202990	L0202937
	Dilution Factor	500	1000	400	40	400	500	400	100	1	1
	Sample Date	03/28/2002	03/28/2002	03/28/2002	03/27/2002	03/27/2002	03/27/2002	03/27/2002	03/27/2002	03/28/2002	03/21/2002
	Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Compound	Matrix	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
1,4-Dichlorobenzene		1200 U	2500 U	1000 U	100 U	1000 U	1200 U	1000 U	250 U	2.5 U	2.5 U
Benzene		250 U	500 U	200 U	20 U	200 U	250 U	200 U	50 U	0.5 U	0.5 U
Chlorobenzene		250 U	500 U	200 U	20 U	200 U	250 U	200 U	50 U	0.5 U	0.5 U
Ethylbenzene		1300	1300	2100	20 U	1000	860	550	500	0.5 U	0.5 U
Naphthalene		1200 U	2500 U	1000 U	100 U	1000 U	1200 U	1000 U	250 U	2.5 U	2.5 U
Toluene		600	1400	350	30 U	1100	820	990	720	0.75 U	0.75 U
Trichloroethene		250 U	500 U	200 U	20 U	200 U	250 U	200 U	50 U	0.5 U	0.5 U
Vinyl chloride		20000	2700	6100	150	21000	14000	14000	7000	1 U	1 U
cis-1,2-Dichloroethene		45000	37000	41000	1000	370	16000	3300	11000	0.5 U	0.5 U
o-Xylene		250 U	500 U	200 U	20 U	200 U	250 U	200 U	50 U	0.5 U	0.5 U
m,p-Xylenes		250 U	500 U	200 U	20 U	200 U	250 U	200 U	50 U	0.5 U	0.5 U
trans-1,2-Dichloroethene		380 U	750 U	300 U	30 U	300 U	380 U	300 U	75 U	0.75 U	0.75 U

NOTES: U - not detected, J - estimated value, R - unusable, --- - not analyzed.
Dup - references blind field duplicate sample that was collected. Lab Dup - laboratory duplicate analyses conducted.

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O'BRIEN & GERE ENGINEERS, INC.

Table 1
Sullivan's Ledge Superfund Site
Ground Water Samples
Method 8260B Volatile Organic Compound Data

	Sample ID	TRIP BLANK
	SDG ID	L0203390
	Dilution Factor	1
	Sample Date	04/05/2002
	Units	ug/L
Compound	Matrix	WATER
1,4-Dichlorobenzene		2.5 U
Benzene		0.5 U
Chlorobenzene		0.5 U
Ethylbenzene		0.5 U
Naphthalene		2.5 U
Toluene		0.75 U
Trichloroethene		0.5 U
Vinyl chloride		1 U
cis-1,2-Dichloroethene		0.5 U
o-Xylene		0.5 U
m,p-Xylenes		0.5 U
trans-1,2-Dichloroethene		0.75 U

NOTES: U - not detected, J - estimated value, R - unusable, — - not analyzed.
Dup - references blind field duplicate sample that was collected. Lab Dup - laboratory duplicate analyses conducted.

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ENGINEERS, INC.

Table 2
Sullivan's Ledge Superfund Site
Ground Water Samples
Method 8082 PCB Data

Compound	Sample ID	BEI-1	BEI-2	BEI-2 Dup	BEI-3	OBG-1	OBG-2	OBG-3	Collection Trench	MW-2	MW-2 Dup
	SDG ID	L0203390	L0203390	L0203390	L0203390	L0203390	L0203390	L0203390	L0203390	L0203024	L0203024
	Dilution Factor	1	1	1	1	1,20	1	1	1	1	1
	Sample Date	04/09/2002	04/09/2002	04/09/2002	04/09/2002	04/09/2002	04/09/2002	04/09/2002	04/09/2002	03/29/2002	03/29/2002
	Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
	Matrix	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
Aroclor 1221		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.535 U	0.538 U
Aroclor 1232		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.535 U	0.538 U
Aroclor 1242/1016		2.97 *	2.05 *	1.94 *	0.5 U	22 *	0.5 U	6.04 *	2.9 *	2.31 *	2.36 *
Aroclor 1248		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.535 U	0.538 U
Aroclor 1254		0.795 J	0.5 U	0.5 U	1.04 J	108	0.5 U	0.5 U	0.5 U	0.535 U	0.538 U
Aroclor 1260		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.535 U	0.538 U

NOTES: U - not detected, J - estimated value, R - unusable, --- - not analyzed.
Dup - references blind field duplicate sample that was collected. Lab Dup - laboratory duplicate analyses conducted.
* - Altered PCB Aroclor.

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O'BRIEN & GERE ENGINEERS, INC.

Table 2
Sullivan's Ledge Superfund Site
Ground Water Samples
Method 8082 PCB Data

	Sample ID	MW-4	MW-6A	MW-14	MW-15	MW-24
	SDG ID	L0203024	L0202990	L0203024	L0202937	L0202990
	Dilution Factor	1	1	1	1	1,10
	Sample Date	03/29/2002	03/27/2002	03/29/2002	03/26/2002	03/28/2002
	Units	ug/L	ug/L	ug/L	ug/L	ug/L
Compound	Matrix	WATER	WATER	WATER	WATER	WATER
Aroclor 1221		0.521 U	0.5 U	0.538 U	0.5 U	0.5 U
Aroclor 1232		0.521 U	0.5 U	0.538 U	0.5 U	0.5 U
Aroclor 1242/1016		0.521 U	0.5 U	0.538 U	1.26 *	17 J
Aroclor 1248		0.521 U	0.5 U	0.538 U	0.5 U	0.5 U
Aroclor 1254		0.521 U	0.5 U	0.538 U	0.5 U	0.5 U
Aroclor 1260		0.521 U	0.5 U	0.538 U	0.5 U	0.5 U

NOTES: U - not detected, J - estimated value, R - unusable, --- - not analyzed.
Dup - references blind field duplicate sample that was collected. Lab Dup - laboratory duplicate analyses conducted.
* - Altered PCB Aroclor.

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Table 3
Sullivan's Ledge Superfund Site
Ground Water Samples
Method 6010B/7470A Inorganic Data

Compound	Sample ID	BEI-1	BEI-2	BEI-2 Dup	BEI-3	OBG-1	OBG-2	OBG-3	Collection Trench
	SDG ID	L0203390	L0203390	L0203390	L0203390	L0203390	L0203390	L0203390	L0203390
	Dilution Factor	1	1	1	1	1	1	1	1
	Sample Date	04/09/2002	04/09/2002	04/09/2002	04/09/2002	04/09/2002	04/09/2002	04/09/2002	04/09/2002
	Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	Matrix	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
Aluminum		0.1 U	0.1 U	0.1 U	0.1 U	0.25	0.1 U	0.1 U	0.1 U
Barium		0.55	0.66	0.66	0.1	1.5	1.8	0.68	1
Chromium		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01	0.01 U
Copper		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.07	0.01 U
Iron		54	54	53	2	120	80	51	78
Lead		0.005 U	0.005 U	0.005 U	0.005 U	0.005	0.005 U	0.022	0.006
Vanadium		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Zinc		0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.82	0.05 U

NOTES: U - not detected, J - estimated value, R - unusable, --- - not analyzed.
Dup - references blind field duplicate sample that was collected. Lab Dup - laboratory duplicate analyses conducted.

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O'BRIEN & GERE
ENGINEERS, INC.

June 27, 2002

Mr. David O. Lederer
Remedial Project Manager
Environmental Protection Agency (HBO)
Region 1
1 Congress Street, Suite 1100
Boston, MA 02114-2023

Re: Sullivan's Ledge Superfund Site
Quarterly Ground Water
Sampling Event – Spring 2002

File: 5509/28602 #2

Dear Dave:

Please find enclosed for your review the Quarterly Ground Water Sampling Event – Spring 2002. Please contact me if you have any questions concerning this document.

Very truly yours,

O'BRIEN & GERE ENGINEERS, INC

James R. Heckathorne, PE
Vice President

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Attachment

cc: S. Wood, E. Vaughn, S. Alfonse, P. Steinberg, E. Bertaut, D. Dwight, M. Wade, G. Swenson, R. Connors